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PROPOSED EURATOM AGREEMENTS

UNIVERSITY OF MICHIGAN

AUG 19 1958

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HEARINGS

BEFORE THE

JOINT COMMITTEE ON ATOMIC ENERGY

CONGRESS OF THE UNITED STATES

EIGHTY-FIFTH CONGRESS

SECOND SESSION

ON THE

PROPOSED EURATOM AGREEMENTS AND LEGISLATION TO CARRY OUT THE PROPOSED COOPERATIVE PROGRAM

PART 1

JULY 22, 23, 24, 29, and 30, 1958

Printed for the use of the Joint Committee on Atomic Energy

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PROPOSED EURATOM AGREEMENTS

TUESDAY, JULY 22, 1958

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met, pursuant to call, at 10 a. m. in room 457, Senate Office Building, Hon. Carl T. Durham (chairman of the committee) presiding.

Present: Representatives Durham, Holifield, Price, Van Zandt, and Hosmer; Senators Anderson, Pastore, and Hickenlooper.

Also present: James T. Ramey, executive director; David R. Toll, staff counsel; George E. Brown, Jr., George F. Murphy, professional staff members; Captain Nels Nelson, United States Navy, staff technical adviser, Joint Committee on Atomic Energy.

Chairman DURHAM. The committee will be in order.

This morning the Joint Committee on Atomic Energy is meeting in public session to consider the proposed EURATOM agreements providing for cooperation between the United States and the six member nations of the EURATOM group in the development of atomic power. The initial target of this cooperative program is the construction of six nuclear powerplants in Europe by 1963 producing a total of 1 million kilowatts of electrical energy.

In embarking on these hearings it might be appropriate at this point to refer to the remarks which I made at the opening of the section 202 hearings on the development, growth and state of the atomic energy industry in February of 1957. In reviewing the situation of our atomic power at that time, I said:

> Although we see steady progress in our technology, the technical and engineering problems encountered appear to be considerably greater than anticipated in many lines. This discouraging note applies to both Government-financed and privately financed projects.

I also referred at that time to the growing problem of cost increases in both private and Government-financed power reactor projects, and to the fact that completion dates on some of these projects were being extended. Then I said:

> Although the immediate financial incentives in this country for reactors does not appear good for the next few years, the need for reactors abroad is apparently very great and immediate. Thus the "three wise men" of EURATOM indicated that EURATOM needed 3 million kilowatts of atomic power in 1963 and 15 million by 1967.

I think the considerations discussed back in February of 1957 are still valid. It is still quite apparent that atomic power requirements in Europe at the present time are more pressing than they are in the United States and that higher costs of conventional power in Europe indicate that atomic power will become economical in Europe before

it does in the United States. It also follows that Europe may prove to be an important source of new business for American manufacturers of atomic power equipment at a time when domestic business is lagging.

I would like to reiterate this morning the comments I made in my foreword to the committee print on the proposed agreements, namely, that:

"The Euratom agreements, together with the attached materials and suggested legislation, involve matters of great importance to United States policy, particularly with regard to United States cooperation with our European allies and the development of United States atomic-power plans abroad. A number of complex issues affecting the national interest are raised by these proposed agreements which must, of necessity, receive the most careful and thorough consideration by the Congress.

In view of the press of business in the final weeks of the present session of Congress, it is regretted that the proposed agreements were not submitted to Congress until late last month for consideration and action. However, the Joint Committee appreciates the importance of the proposed agreements with regard to development of the United States atomic-power program abroad and the advancement of European economic integration. For these reasons, the committee intends to give prompt consideration to the proposed agreements with a view to securing congressional action to the proposals at the earliest practicable moment.

I might add that the present situation in the Middle East serves to underline the urgency for developing atomic power in Western Europe as a means of relieving the nations of that area from dependence on Middle East oil for their power requirements. The main impetus for Euratom largely resulted from this consideration, originally brought into focus by the Suez crisis and reemphasized by recent events in the Middle East.

I would like at this point to insert in the record several letters and documents which pertain directly to the matters we are about to discuss. They are: The Joint Communique by the State Department, AEC, and the Euratom Committee, dated February 8, 1957, The Joint Committee press releases, dated July 9 and July 14, announcing public hearings on the proposed Euratom agreements; Joint Committee letters to the Atomic Energy Commission and Department of State, dated July 9, 1958, regarding these hearings, together with a reply by the State Department; the AEC letter of transmittal to the Joint Committee, dated June 23, 1958, forwarding the proposed agreements and attached materials, the President's message to Congress transmitting the proposed agreements; the proposed international agreement between the United States and Euratom, pursuant to section 124 of the Atomic Energy Act of 1954; the proposed agreement for cooperation between the United States and Euratom, pursuant to section 123 of the Atomic Energy Act of 1954; a copy of H. R. 13119 (S. 4047), introduced by request, providing legislative implementation of United States participation in the cooperative program; and the exchange of correspondence between the United States and Euratom regarding the safeguards provisions of the proposed agreements.

(NOTE.—Memorandum of understanding between United States and Euratom will be found in the appendix, p. 393.)

(The material referred to is as follows:)

JOINT COMMUNIQUE BY THE DEPARTMENT OF STATE, THE CHAIRMAN OF THE ATOMIC ENERGY COMMISSION, AND THE EURATOM COMMITTEE, FEBRUARY 8, 1957

1. A Committee appointed by the Governments of Belgium, France, Germany, Italy, Luxembourg, and the Netherlands which are negotiating at Brussels the treaty for a European atomic energy community (Euratom) concluded today its official visit in Washington. The Committee, composed of Mr. Louis Armand, Mr. Franz Etzel, and Prof. Francesco Giordani, called on President Eisenhower, the Secretary of State, and the Chairman of the United States Atomic Energy Commission, and held discussions with officials of the Department of State and the Commission.

2. The Committee's task is to determine the extent to which atomic power can meet Europe's growing energy needs. The availability and cost of energy has become a limiting factor on the growth of Europe's economic strength and welfare. The Committee's review of the needs and possibilities has led it to adopt as an objective the stabilization of fuel imports early in the 1960's. To meet this target would require that nuclear powerplants with a total generating capacity of 15 million kilowatts be installed within the next 10 years.

3. Examination of the Committee's program indicates that its objective is feasible. Under present circumstances, the availability of nuclear fuels is not considered to be a limiting factor. A joint group of experts to be designated by the Committee and the Atomic Energy Commission will continue to examine the technical problems posed by the Committee's objective.

4. The Committee pointed out that the Atomic Energy Community (Euratom) which will result from the present Brussels negotiations provides the framework and the stimulus required to realize the Committee's objective. It would mobilize in Europe the technical and industrial resources required and would provide a political entity competent to afford adequate safeguards and to enter into comprehensive and practical engagements with the United States Government.

5. The United States Government welcomes the initiative taken in the Committee's proposal for a bold and imaginative application of nuclear energy. On February 22, 1956, President Eisenhower in announcing the allocation of 20,000 kilograms of U–235 for sale or lease outside the United States for peaceful purposes (principally power and research reactors) stated, "significant actions are underway to create an international agency and an integrated community for Western Europe to develop peaceful uses of atomic energy.

"The United States welcomes this progress and will cooperate with such agencies when they come into existence."

The United States anticipates active association in the achievement of the Committee's objective, and foresees a fruitful two-way exchange of experience and technical development, opening a new area for mutually beneficial action on both the governmental and the industrial level and reinforcing solidarity within Europe and across the Atlantic.

[No. 173—For immediate release, July 9, 1958]

From the Office of the Joint Committee on Atomic Energy.

The Joint Committee on Atomic Energy plans to hold public hearings beginning July 16 on the proposed Euratom agreement, it was announced today by Representative Carl T. Durham, committee chairman. Representatives of the State Department are scheduled to lead off at 10 a. m. and AEC representatives will appear before the committee at 2 p.m. on July 16.

In addition to official witnesses, the committee will provide an opportunity during the week of July 21 for nongovernmental witnesses to appear before the committee or file a statement for the record. Organizations and individuals who wish to appear before the committee or file a statement of their views should contact the Joint Committee office in room F–88, the Capitol, as soon as possible so that the necessary arrangements may be made.

In announcing the committee hearings, Chairman Durham stated:

"The proposed Euratom agreement is an important and complex matter which requires detailed consideration by the Joint Committee and the Congress. It is regretted that submission of the proposed agreement was not made to the

Congress until late last month, but the committee intends to give the proposal prompt and thorough consideration."

Chairman Durham also announced that the committee is preparing for publication as a committee print the various documents and proposed legislation connected with the Euratom agreement. Included in the print will be correspondence between the committee, the AEC, and the State Department raising questions of committee interest concerning the proposed agreement, together with a copy of a letter sent to reactor experts requesting their comments on the proposed agreement.

[Press release No. 178, from the Office of the Joint Committee on Atomic Energy (July 17, 1958]

Representative Carl T. Durham, Chairman of the Joint Committee on Atomic Energy, announced today that public hearings on the proposed Euratom agreements, which have been postponed because of the press of committee business, are now scheduled to begin on Tuesday, July 22, at 10 a. m., and will continue through Thursday, July 24.

Representatives of the Department of State will appear before the committee on Tuesday morning and representatives of the Atomic Energy Commission will appear Wednesday morning to present their views on the proposed agreements. Thursday morning has been reserved for public witnesses.

JULY 9, 1958.

DR. WILLARD F. LIBBY,
Acting Chairman, United States Atomic Energy Commission,
Washington, D. C.

DEAR DR. LIBBY: This will confirm Mr. Ramey's notification to Admiral Foster that the Joint Committee will begin public hearings on the Euratom program and proposed implementing legislation (H. R. 13119 and S. 4047) on Wednesday, July 16, at 10 a. m. and 2 p. m. Representatives of the State Department are expected to lead off the testimony at 10 a. m. A copy of our letter to the State Department is attached.

It is expected that Commission representatives would present testimony on the Euratom program at the 2 p. m. session on Wednesday.

Attached for your information is a copy of a list of questions which the Joint Committee has addressed to a group of reactor experts and industry representatives on the Euratom program. It would be appreciated if the Commission would make appropriate comments on these questions during its presentation.

Among other matters in which the Joint Committee will be particularly interested, and on which testimony from the Commission would appear pertinent, are the following:

1. A description of how the technical program and financial and administrative arrangements were developed, including the extent to which the United States atomic-equipment industry as a group or individually was consulted in the formation of the program.

2. The relationship between the Euratom program and the United States domestic atomic-energy program. What guaranties do we have that funds provided under the program will be used for contracts with United States atomic-equipment manufacturers?

3. The question of whether the program is or can be planned and phased so as to provide not only for construction of "proven" reactor types but also for reactor types which the Commission believes can be proven out in a large-scale program in the time period allowed.

4. The question of whether the particular subsidy arrangements are as desirable as possible alternatives such as capital subsidy, waiver of use charges, and the like. (See p. 209.)

5. The methods of protecting the United States financial interests in connection with the sale of U–235 on the installment plan, i. e., the problem of retention of title to the material, downpayments, etc.

6. What rights does the United States retain as to control of the price of the U–235 once it has been sold to Euratom? i. e., can Euratom place an additional charge to cover overhead? Profit? Can Euratom or the industrial Euratom countries raise tariffs on atomic equipment sold by American manufacturers under the program?

7. The status of third party liability and indemnity coverage of the Euratom program, and the effect of any delay of such coverage on meeting the 1963 deadline date.

8. The question of the methods of inspection provided, and the relationship to the International Atomic Energy Agency inspection standards, procedures, and personnel.

9. The proposed methods of information exchange, and patent and licensing arrangements, including the extent to which American manufacturers are protected as to utilization of United States patents and know-how by foreign firms in manufacturing reactors of the same type.

In addition to the above comments and information requested it would be appreciated if you would provide the committee with information on how the Commission is organized to administer its overall foreign atomic power program and particularly how it will be organized to administer the Commission's responsibilities in the Euratom program. In this connection we would appreciate information on the Commission's organizational relationships with the State Department, the International Cooperation Administration and the Executive Office of the President in connection with the administration of the Euratom and other foreign atomic energy programs.

In connection with the committee's interest in the foreign atomic power programs and particularly Euratom, it would appear desirable for the Commission to bring up to date its statement of last year on foreign atomic power programs for inclusion as an appendix to the Euratom hearings. (See appendix, p. 383.)

Sincerely yours,

CARL T. DURHAM, *Chairman.*

JULY 9, 1958.

Hon. JOHN FOSTER DULLES,
Secretary of State.

DEAR MR. SECRETARY: This will confirm Mr. Ramey's phone notification to Mr. Farley that the Joint Committee will begin public hearings on the Euratom arrangement and agreements on Wednesday, July 16, at 10 a. m. The hearing room will be announced at a later date.

It is understood representatives of the State Department will lead off the hearings, presumably with a statement outling how the Euratom proposal fits into the Government's overall foreign policy, particularly in relation to the European area.

Attached for your information is a copy of a list of questions we have sent to a group of reactor experts and atomic energy industry representatives concerning the Euratom program. (See p. 307.) Representatives of the AEC also have been requested to comment on these questions. Please feel free to comment on any of the questions which you believe are pertinent to the State Department's interests.

In addition to the State Department's comments along the above lines it would appear appropriate for the State Department specifically to discuss the foreign policy implications of the inspection measures proposed for the Euratom program and its relationships to the International Atomic Energy Agency inspection standards and procedures.

We also would like to receive information on how the State Department is organized to administer its responsibilities in the foreign atomic energy field, particularly in relation to Euratom. In that connection we would appreciate information of your relationship with the Atomic Energy Commission, the International Cooperation Administration, and the Executive Office of the President.

A copy of our letter to the Atomic Energy Commission is attached.

Sincerely yours,

CARL T. DURHAM, *Chairman.*

DEPARTMENT OF STATE,
July 18, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. DURHAM: This is to acknowledge your letter of July 9, 1958, to the Secretary regarding the hearings on the joint United States-Euratom program and the congressional activities required to implement it. I need hardly point out

that the current Middle East crisis reemphasizes Europe's need for nuclear power as an alternative source of fuel which has been one of the major motivations of the program from the outset. The Department stresses again the urgency of the program, as was noted by the President in his message to the Congress on June 23.

As you no doubt know, Under Secretary Dillon will be the chief witness for the Department of State at the hearings before the Joint Committee, which we are now told will begin at 10 a. m. on July 22. Mr. Dillon and his assistants will be prepared to discuss in detail at that time the questions you raised in your letter.

Sincerely yours,

WILLIAM B. MACOMBER, Jr.,
Assistant Secretary.

LETTER OF TRANSMITTAL

ATOMIC ENERGY COMMISSION,
Washington, D. C., June 23, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: The President has transmitted to the Speaker of the House of Representatives and the President of the Senate a proposed international agreement between the United States of America and the European Atomic Energy Community for the approval by Congress pursuant to provisions of sections 11 (1) and 124 of the Atomic Energy Act of 1954, as amended. The approval by the Congress of the proposed international agreement will be one of the first steps necessary to initiate a proposed cooperative nuclear power program between the United States and the Community which will be designed to foster the construction in Europe by 1963 of approximately six major nuclear power reactors having a total installed capacity of approximately 1 million kilowatts of electricity. I am enclosing a copy of the President's message of transmittal (appendix A), as well as the international agreement (appendix B).

On May 29, 1958, the Commission of the European Atomic Energy Community and on June 12, 1958, the Secretary of State and I signed a memorandum of understanding which was prepared as the first step in reaching agreement with respect to the proposed program. Enclosed are three certified copies of this document (appendix C). There also has been negotiated, pursuant to section 123 of the act, a proposed agreement for cooperation embodying the proposed program which has been initialed by the parties. I am enclosing three certified copies of this document for the information of the Joint Committee (appendix D). Following the approval of the international agreement by Congress the agreement for cooperation will be submitted to the President in conformance with the provisions of section 123 of the act and thereafter submitted to the Joint Committee in the usual manner.

In his message to Congress the President noted that, in addition to the international agreement, the necessary legislative, authorization, and appropriation requests required to carry out the program would be submitted shortly. There is transmitted herewith as appendix E a draft bill providing such additional authority as the Commission believes necessary to carry out the proposed program.

I believe it would be helpful if I summarized the proposed program of cooperation as well as the legislative action being requested so that you might see how the two are related.

The aim of the joint program is to bring into operation in the Community, by 1963, about 1 million electric kilowatts of installed nuclear capacity, in reactors of proven types developed in the United States, and to initiate immediately a joint research and development program centered on these types of reactors. The program would be conducted so as to obtain maximum support of the industries of the Community and of the United States in achieving these objectives.

The total capital cost of the reactors to be included in the program, exclusive of fuel, has been estimated as not to exceed $350 million. Approximately $215 million would be provided for by the participating utilities and other European sources of capital, such financing to be arranged with the appropriate assistance of Euratom. In addition, up to $135 million would be provided by the Export-

Import Bank to Euratom in the form of a long-term line of credit at 4½ percent interest to cover a portion of the total capital costs. The funds provided by the Export-Import Bank would be re-lent by Euratom. Preliminary contacts by Euratom with European utilities have indicated that the utilities will have no difficulty in arranging financing equivalent to that needed for 1 million kilowatts of conventional power—about $150 million. This, plus the United States loan of $135 million, leaves approximately $65 million to be found of the overall capital cost of the program. The President of the Euratom Commission has already approached the European Investment Bank and has asked that the bank take the lead in arranging for financing this remaining $65 million.

The nuclear powerplants under the program will be built, owned, and operated by utilities in the member states. All risks due to uncertainties in construction, maintenance, and operating costs and load factors will be borne directly by these utilities. In the course of the negotiation it was determined that the economic risks associated with the reactor fuel cycle must be minimized if participation by the European utility industry is to be reasonably assured. To this end, the United States, for a 10-year period of operation, will guarantee ceiling costs for the fabrication of the fuel elements required, as well as a fixed life for these elements. The provision of this form of assistance is considered to be vital to the success of the program. Attachment A to the memorandum of understanding enclosed describes this proposed fuel cycle arrangement in detail.

Section 4 of the proposed legislation, in accordance with section 261 (a) (2) of the Atomic Energy Act, would provide the funds and other authority necessary to carry out this aspect of the joint program. Contracts entered into under this section would not extend for a period longer than that necessary to cover fuel loaded into a reactor constructed under the joint program during 10 years of its operation or prior to December 31, 1973, whichever is earlier.

A joint research and development program also would be established. This program, which would be for a 10-year period, would be centered on the improvement in the performance of the reactors involved in the program, and the lowering of fuel cycle costs. During the first 5 years, the financial contribution of the community and the United States would amount to about $50 million each. The sum required for the second 5-year period would be determined at a later date. Section 3 of the proposed legislation would provide the Commission with the authority it requires to participate in this phase of the program.

Under the arrangements proposed, the United States would sell to the Community a net quantity of 30,000 kilograms of contained U–235 in uranium to cover the fueling and other requirements of the program for such material over a 20-year operating period. The initial operating inventory, which amounts to approximately 9,000 kilograms of contained U–235, would be sold to the Community on a deferred-payment basis. The balance of about 20,000 kilograms, which represents estimated burnup and process losses over the 20-year operating period, and 1,000 kilograms to provide for research and test reactors associated with the program, would be paid for on a current basis.

A relatively small amount of plutonium would be provided to the Community for research purposes. The quantities of enriched uranium to be made available would come from quantities of U–235 set aside by the President under section 41 b. of the Atomic Energy Act for distribution to foreign countries. Section 5 of the proposed bill contains the congressional authorization which is required, pursuant to section 54 of the Atomic Energy Act, before quantities of special nuclear material may be transferred to "a group of nations." The transfer, of course, also would be subject to the provisions of the agreement for cooperation to be entered into between the United States and the European Atomic Energy Community.

Ownership and responsibility for the approximate quantity of 21,000 kilograms of special nuclear material for which Euratom pays in cash will be transferred to the Community at a designated port or ports of embarkation. For the initial operating inventory of about 9,000 kilograms made available under a deferred payment plan the Commission will retain such rights in the material as are appropriate to secure the payment of the debt due under the sales agreement. Such rights will be encumbrances on the material and will be set forth in the sales agreement. They will include provisions relating to the return of special nuclear material in sufficient quantities to satisfy the Community's debt to the Commission in the event Euratom does not meet the payment schedule set forth in the sales agreement and provisions that the

Community will not establish any obligation with respect to such material which has priority over the Commission's rights.

It is contemplated that the United States also would be prepared to perform, on terms and conditions to be agreed, chemical processing services with respect to any source or special nuclear material received by Euratom from the United States under this program. Section 6 of the proposed legislation would permit the Atomic Energy Commission to enter into long-term contracts with the Community to provide such services for such periods of time as the Commission may deem necessary or desirable at established domestic prices in effect in the United States at the time of delivery of such material.

The arrangements that have been formulated provide that the International Atomic Energy Agency would have the right of first option to purchase special nuclear materials produced in reactors fueled with materials obtained from the United States under the joint program, which are in excess of the Community's need for such material for peaceful uses. In the event this option was not exercised by the Agency, the United States would be prepared to purchase such material. Such purchases by the IAEA or the United States would be at the established fuel value price in effect in the United States at the time of purchase. In keeping with the President's announcement of November 18, 1956, the material purchased by the United States would be used solely for peaceful purposes. Section 7 (a) of the proposed legislaiton authorizes the Atomic Energy Commission to acquire from the Community up to 4,100 kilograms of plutonium for peaceful purposes.

In conjunction with this phase of the program it has been concluded that it will be necessary to provide the Atomic Energy Commission with authority to enter into contracts with Euratom which would provide the utilities participating in the program with a long-term assurance regarding the acquisition by the United States of the plutonium involved. Section 7 (b) of the proposed legislation, accordingly, provides that the Commission may enter into contracts for the acquisition of such material provided that no such contract shall be for a period greater than 10 years of operation of the reactors involved or extend beyond December 31, 1973, whichever is earlier. This section also provides that this material must be purchased at the Commission's established fuel value price at the time of delivery for such material. Section 7 (c) further provides that the Commission may enter into contracts for the acquisition of enriched uranium from the Community provided that any such contract does not extend beyond the terminal date of the agreement for cooperation to be entered into between the United States and the Community, the quantities so acquired do not exceed those distributed to the Community by the Commission, less burnup, and the price paid for the material does not exceed the Commission's established charges for such material in effect at the time of delivery to the Commission.

One of the major purposes of the proposed program would be to provide industry in the United States and Europe with important engineering experience and data on capital and operating costs. As a consequence the proposed arrangement contemplates that technological and economic data developed under the joint program will be made available to the industries within the Community and the United States under provisions designed to assure the widespread dissemination of information developed in the course of the program.

In formulating the proposed program the representatives of the Community and the United States recognized that it would be in their interest to establish a mutually acceptable arrangement which would assure that the materials involved would be used solely for peaceful purposes. Under the arrangement that has been developed, the Community has made all of the guarantees required by the Atomic Energy Act that none of the materials supplied will be used for military purposes. The Community also has assumed the responsibility for the establishment of a safeguard system in accordance with a series of principles set forth in the memorandum of understanding. These principles are compatible with and are based on article XII of the statute of the International Atomic Energy Agency, chapter VII of the treaty establishing the European Atomic Energy Community and those adopted by the United States in its comprehensive agreements for cooperation. The system to be established will be designed to assure that the materials received from the United States, as well as special nuclear material produced therefrom, only will be used for peaceful purposes. The United States will assist the Community in establishing the system and there will be frequent consultation and visits to assure that the system is operating effectively under the agreed upon principles. Both parties have agreed that the terms of the agreement include permission for verification, by

mutually approved scientific methods, of the effectiveness of the safeguard and control systems applied to nuclear materials received from the other party or derived therefrom in connection with the joint program. The continuation of the cooperative program will be contingent upon the Community's establishing and maintaining a mutually satisfactory safeguards system. The Community also is prepared to consult with the International Atomic Energy Agency to assure that the system will be reasonably compatible with that of the Agency. In addition, in the event of the establishment of an international safeguards and control system by the International Atomic Energy Agency, the United States and Euratom will consult regarding assumption by that Agency of the safeguards and control over fissionable material utilized and produced in implementation of the joint program. The Atomic Energy Commission and the Department of State believe that the special safeguard arrangement proposed with Euratom will provide the United States with the assurance that the materials involved will be used only for peaceful purposes.

Lastly, in the light of the tight time schedule that faces us in completing all of the necessary legislative steps during this session of Congress to permit the initiation of the program, section 8 of the proposed legislation provides that the Joint Committee may waive the requirements contained in section 123c of the Atomic Energy Act that the proposed agreement for cooperation must lie before the Joint Committee for 30 days while the Congress is in session.

Appendix F to this letter contains a summary of the funding and financial requirements for the proposed program.

Appendix G contains a series of letters that were exchanged by the principal negotiators to clarify various facets of the program.

Appendix H contains a series of working papers that were developed in the course of preparing the memorandum of understanding. These documents should be useful to the committee in reviewing the background and basic assumptions underlying the program.

The Bureau of the Budget has reviewed the proposed legislation and has advised that it is in accord with the program of the President.

In conclusion I should like to mention that I earnestly hope that the Joint Committee will give the proposed program immediate and affirmative consideration. If the objectives of the program are to be realized on schedule it is important that all of the legislative steps necessary to initiate the program be completed during this session of Congress. The Secretary of State has advised me of his enthusiastic support of the program in the light of its considerable importance to our foreign policy objectives in Western Europe. I also believe that the proposed program will result in important benefits to our domestic and foreign program in the field of peaceful uses of atomic energy. We will be happy to discuss these matters with the Joint Committee at your earliest convenience.

Sincerely,

LEWIS L. STRAUSS, *Chairman.*

PRESIDENT'S MESSAGE TO CONGRESS

To the Congress of the United States:

I am transmitting today for approval by the Congress an international agreement between the Government of the United States and the European Atomic Energy Community which will be a first step toward mutually beneficial cooperation in the peaceful applications of atomic energy between this new European Community and the United States. The specific program which I am asking the Congress to consider and approve on an urgent basis is a joint undertaking by the United States and Euratom to foster the construction in Europe by 1963 of approximately six major nuclear power reactors which would produce about 1 million kilowatts of electricity.

This international agreement is being submitted pursuant to the provisions of sections 11(L) and 124 of the Atomic Energy Act of 1954, as amended. The cooperation to be undertaken after approval of the international agreement will be pursuant to the terms and conditions of an agreement for cooperation entered into in accordance with section 123 of that act.

The elements which combine to make such a joint program possible are the same that led to the first great breakthrough in the development of atomic energy 15 years ago: the intimate association of European and American scientists and close association between European and American engineers and in-

dustries. While the joint nuclear power program draws heavily on the history of atomic energy development there are important new elements which reflect the changing world scene.

The first is the changing face of Europe symbolized by the European Atomic Energy Community, which now takes its place beside the Coal and Steel Community and the European Economic Community (Common Market) in a further major step toward a united Europe. The inspiration of European statesmen which has now come to fruition in Euratom is the simple but profoundly important idea that through concentration of the scientific and industrial potentialities of the six countries it will be possible to develop a single major atomic-energy complex, larger than the sum of the parts, and designed to exploit the peaceful potential of atomic energy. One motivation which has therefore led to the creation of this new Community is the growing sense of urgency on the part of Europeans that their destiny requires unity and that the road toward this unity is to be found in the development of major common programs such as Euratom makes possible. Another important motivation is the present and growing requirements of Europe for a new source of energy in the face of rapidly increasing requirements and the limited possibilities of increasing the indigenous supply of conventional fuels. The Europeans see Atomic energy not merely as an alternative source of energy but as something which they must develop quickly if they are to continue their economic growth and exercise their rightful influence in world affairs. The success of this undertaking, therefore, is of vital importance to the United States, for the 160 million people on the Continent of Europe are crucial to North Atlantic strength.

It is therefore gratifying that the reactor research, development, testing, and construction program in the United States has progressed to the point that United States reactors of proven types are available and will be selected for commercial exploitation in the joint program of large-scale nuclear reactors.

The abundance of conventional fuel in the United States and hence our lower cost of electricity as contrasted with higher energy costs in Europe means that it is possible for nuclear power reactors to produce economic electrical energy in Europe before it will be possible to do so in most parts of the United States.

The basic arrangements which have been worked out with Euratom are designed to take advantage of many favorable factors and circumstances. They promise to result in a program that will initially be of great benefit to Euratom and the United States, and thereafter to nations everywhere that choose to profit from Euratom's experience. American knowledge and industrial capacity will be joined with the scientific and industrial talents of Europe in an accelerated nuclear power program to meet Europe's presently urgent need for a new source of energy.

The plants to be built will be paid for and operated by the existing public and private utilities in the six countries; components will be manufactured by American and European industry. Through this association the basis will be laid for future mutually beneficial commercial collaboration in the atomic-energy business. The major portion of the fund for the construction of the plants will come from European sources of capital. The United States, through the Export-Import Bank, is prepared to supplement these funds by making available to the new Community a long-term line of credit.

A central purpose of the proposed joint program is for Euratom and the United States Government to create an institutional and economic environment which will encourage the European utilities to embark quickly upon a large-scale nuclear power program. As this program goes forward, it will make possible significant progress in the development of atomic power elsewhere in the world.

The expectation that nuclear power will be economic rests on the inherent promise of achieving substantially lowered fuel costs which will more than compensate for the higher capital costs of nuclear plants. The principal immediate problem is to limit during this developmental phase the economic uncertainties connected with the burning of nuclear fuel in these reactors. To assist in meeting this problem the United States will provide certain special and limited guaranties and incentives to permit American fuel fabricators and the European utilities and industries to enter into firm contractual arrangements with greater certainty as to the actual costs of nuclear energy from the reactors than is now possible.

Of major importance, the new European Community and the United States will establish a jointly financed research and development program, the purpose of which will be to improve the performance of these reactors and thus to fur-

ther the economic feasibility of nuclear power. Information developed under the joint program will be made available to American and European industry for the general advancement of power-reactor technology.

In addition to the international agreement submitted herewith, the necessary requests for congressional action required to carry out the program will be submitted shortly.

I believe that the initiation of this program of cooperation with Euratom represents a major step in the application of nuclear technology for the benefit of mankind.

The United States and Euratom have reaffirmed their dedication to the objectives of the International Atomic Energy Agency and intend that the results of this program will benefit the Agency and the nations participating in it. Consideration is now being given to ways in which the United States can work with the Agency in carrying forward its functions. A proposed agreement for cooperation with the International Atomic Energy Agency is now being negotiated and is under review by the Agency. This agreement provides principally for the transfer of the special nuclear material already offered to the Agency by the United States, for certain services such as chemical processing, and for the broad exchange of unclassified information in furtherance of the Agency's program.

In recognition of the importance of the joint United States-Euratom program, I must stress its urgency. It was only the 1st of January of this year that the new Community came into being, determined to fulfill its obligation to create the conditions which will permit the earliest development of nuclear power on a major scale. The Community is determined, as are we, that the joint program should be initiated this year. I am sure that the Congress, having in mind the political and economic advantages which will accrue to us and our European friends from such a joint endeavor, will wish to consider quickly and favorably the proposed program.

THE WHITE HOUSE, *June 23, 1958.*

AGREEMENT BETWEEN THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND THE EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM)

WHEREAS the European Atomic Energy Community (EURATOM) has been established by the Kingdom of Belgium, the Federal Republic of Germany, the French Republic, the Italian Republic, the Grand Duchy of Luxembourg, and the Kingdom of the Netherlands, in the Treaty of Rome signed on March 25, 1957, with the aim of contributing to the raising of the standard of living in Member States and to the development of commercial exchanges with other countries by the creation of conditions necessary for the speedy establishment and growth of nuclear industries;

WHEREAS the Government of the United States of America has instituted a program of international cooperation to make available to cooperating nations the benefits of peaceful applications of atomic energy as widely as expanding technology and considerations of the common defense and security will permit;

WHEREAS the Government of the United States of America and the European Atomic Energy Community (EURATOM) have expressed their mutual desire for close cooperation in the peaceful applications of atomic energy, and the European Atomic Energy Community (EURATOM) intends to foster an extensive program which promises to redound to their common benefit;

WHEREAS an arrangement providing for cooperation in the peaceful applications of atomic energy would initiate a fruitful exchange of experience and technical development, open a new era for mutually beneficial action on both the governmental and industrial level, and reinforce solidarity within Europe and across the Atlantic;

The Parties agree as follows:

ARTICLE I

The Parties will cooperate in programs for the advancement of the peaceful applications of atomic energy. Such cooperation will be undertaken from time to time pursuant to such terms and conditions as may be agreed and shall be subject to all provisions of law respectively applicable to the Parties. Specifically it is understood that under existing law the cooperation extended by the Government of the United States of America will be undertaken pursuant to an

Agreement for Cooperation entered into in accordance with Section 123 of the Atomic Energy Act of 1954, as amended.

ARTICLE II

As used in this Agreement, "Parties" means the Government of the United States of America and the European Atomic Energy Community (EURATOM), acting through its Commission. "Party" means one of the Parties.

ARTICLE III

This Agreement shall enter into force on the day on which each Party shall have received from the other Party written notification that it has complied with all statutory and constitutional requirements for the entry into force of such Agreement.

IN WITNESS WHEREOF, the undersigned representatives duly authorized thereto have signed this Agreement.

DONE at Brussels on May 29, 1958, and at Washington on June 19, 1958, in duplicate, in the English, French, German, Italian, and Netherlands languages, each language being equally authentic.

For the Government of the United States of America:

JOHN FOSTER DULLES.
LEWIS L. STRAUSS.

For the European Atomic Energy Community (EURATOM):

L. ARMAND.
ENRICO MEDI.
L. KREKELER.
EMANUEL SASSEN.
P. DE GROOTE.

AGREEMENT FOR COOPERATION BETWEEN THE GOVERNMENT OF THE UNITED STATES OF AMERICA AND THE EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM) CONCERNING PEACEFUL USES OF ATOMIC ENERGY

WHEREAS the Government of the United States of America and the European Atomic Energy Community (EURATOM) on ---------- signed an agreement which provides a basis for cooperation in programs for the advancement of the peaceful applications of atomic energy;

WHEREAS the Government of the United States of America and the European Atomic Energy Community (EURATOM) recognize that it would be to their mutual benefit to cooperate by establishing a joint program:

(a) To bring into operation by 1963, within the European Atomic Energy Community (EURATOM), large-scale power plants using nuclear reactors of proven types on which research and development have been carried to an advanced stage in the United States, having a total installed capacity of approximately one million kilowatts of electricity and under conditions which would approach the competitive range of conventional energy costs in Europe;

(b) To initiate immediately a joint research and development program centered on these types of reactors;

The Parties agree as follows:

ARTICLE I

A. Under the joint program, reactor projects may be proposed, constructed and operated by private or governmental organizations in the Community engaged in the power industry or in the nuclear energy field. Such projects will be selected in accordance with technical standards, criteria (including those relating to radiation protection and reactor safety), and procedures developed by the United States Atomic Energy Commission (hereinafter referred to as the "United States Commission") and the Commission of the European Atomic Energy Community (hereinafter referred to as the "EURATOM Commission"). In the evaluation and selection of such reactor projects, the technical and economic features will be considered and approved jointly by the United States Commission and the EURATOM Commission. Other features of such reactor projects will be considered and approved by the EURATOM Commission. Reactors now being planned or constructed in Member States of the Community will be eligible for, and will receive, early consideration under the criteria established pursuant to this paragraph.

B. The total capital cost, exclusive of the fuel inventory, of the nuclear powerplants with an installed capacity of approximately one million kilowatts of electricity to be constructed under the program is estimated not to exceed the equivalent of $350,000,000 to be financed as follows:

1. Approximately $215,000,000 to be provided by the participating utilities and other European sources of capital, such financing to be arranged with the appropriate assistance of the Community; and

2. Up to $135,000,000 to be provided by the Government of the United States of America to the Community in the form of a long-term line of credit on terms and conditions to be agreed, such funds to be re-lent by the Community for the construction of facilities under this program.

C. The United States Commission and the EURATOM Commission will enter into special arrangements with respect to the fuel cycle of reactors to be constructed and operated under the Joint program according to the principles set forth in Annex "A" to this Agreemnt.

ARTICLE II

A. The United States Commission and the EURATOM Commission under mutually agreed arrangements intend to initiate a program of research and development to be conducted both in the United States and in Europe on the types of reactors to be constructed under the joint program. This research and development program will be aimed primarily at the improvement of the performance of these reactors, and at lowering fuel cycle costs. It will also deal with plutonium recycling and other problems relevant to these reactors.

B. The research and development program will be established for a ten (10) year period. During the first five (5) years the financial contribution of the Government of the United States of America and the Community will amount to about $50,000,000 each. Prior to the completion of the first five-year period the Parties will determine the financial requirements for the remaining five-year period and will undertake to procure funds necessary to carry out the program. Funds for the second five-year period may be in the same order of magnitude.

C. The administration of this program will be conducted under arrangements to be mutually agreed.

ARTICLE III

A. The United States Commission will sell to the Community uranium enriched in the isotope U–235 for use in projects designated by the Parties pursuant to the joint program up to a net amount of thirty thousand (30,000) kilograms of contained U–235 in uranium. This net amount shall be the gross quantity of contained U–235 in uranium sold to the Community less than quantity of contained U–235 in recoverable uranium which has been resold or otherwise returned to the Government of the United States of America or transferred to any other nation or international organization with the approval of the Government of the United States of America. The United States Commission will also from time to time sell to the Community such quantities of special nuclear material, in addition to the quantities of enriched uranium set forth above, as may be agreed.

B. Contracts for the sale of special nuclear materials will specify the quantities to be supplied, composition of material, compensation for material, delivery schedules and other necessary terms and conditions. Such contracts for the sale of enriched uranium for fueling power reactors under the joint program may also provide, under terms and conditions to be agreed, that payment for such enriched uranium may be made on a deferred basis. The uranium supplied hereunder for use in reactors designed for production of electric power may be enriched up to twenty percent (20%) by weight in the isotope U–235. The United States Commission, however, may, upon request and in its discretion, make a portion of the foregoing enriched uranium available as material enriched up to ninety percent (90%) for use in materials testing reactors and research reactors, each capable of operating with a fuel load not to exceed eight (8) kilograms of contained U–235 in uranium, and as highly enriched material for use for research purposes.

C. It is agreed that the Community may distribute special nuclear material to authorized users in the Community; the Community will retain, pursuant to the Treaty establishing the European Atomic Energy Community, title to any special nuclear material which is purchased from the United States Commission.

D. The United States Commission is prepared to perform on terms and conditions to be agreed chemical reprocessing services with respect to any source

or special nuclear material received by the Community from the United States under this program. It is agreed that such reprocessing will be performed at established United States domestic prices in effect upon delivery of such material. It is understood, except as may be otherwise agreed, that the form and content of any irradiated fuel elements shall not be altered after their removal from reactors and prior to delivery to the United States Commission or to other facilities. Special nuclear material and other material recoverable from material returned to the United States for reprocessing will be returned to the Community unless otherwise agreed.

E. With respect to any special nuclear material produced in reactors fueled with materials obtained from the United States under this agreement which is in excess of the need of the Community for such materials for the peaceful uses of atomic energy, the International Atomic Energy Agency is granted the right of first option to purchase such materials at the announced fuel value price in effect in the United States at the time of purchase. In the event this option is not exercised by the International Atomic Energy Agency, the Government of the United States of America is prepared to purchase such material at the United States announced fuel value price in effect at the time of purchase.

ARTICLE IV

The United States Commission will assist the EURATOM Commission in obtaining reactor materials other than special nuclear material from private organizations located in the United States if the EURATOM Commission desires such assistance. If no commercial sources are available, specific arrangements may be made by the Parties, from time to time, under terms and conditions to be agreed, for the transfer of such materials.

ARTICLE V

Persons under the jurisdiction of the Government of the United States of America or within the Community will be permitted to make arrangements to transfer and export material, including equipment and devices, to, and perform services for, the other Party and such persons under the jurisdiction of the Government of the United States of America or within the Community (as the case may be) as are authorized by the appropriate Party to receive and possess such material and utilize such services, subject to applicable laws, directives, regulations and license requirements of the Government of the United States of America, the Community and the Member States of the Community.

ARTICLE VI

A. 1. Under mutually agreed arrangements, all non-patentable information developed in connection with the joint program of research and development, and all non-patentable information developed in connection with the selected projects, concerning designs, plans and specifications, construction costs, operations and economics, will be delivered currently to the Parties as developed and may be used, disseminated, or published by each Party for any and all purposes as it sees fit without further obligation of payment. There will be no discrimination in the dissemination or use of such information for the reason that the proposed recipient or user is a national of the United States or of any Member State of the Community.

2. Both Parties shall have access to the records of the participating contractors pertaining to their participation in research and development projects under the joint research and development program, or pertaining to the perperformance of fuel elements that are the subject of United States guarantees.

B. The United States Commission and the EURATOM Commission shall also exchange other unclassified information in fields related to the peaceful uses of atomic energy to further the joint program. Such exchange of information shall include technical advice in the design and construction of future reprocessing plants which the Community may decide to design and construct or sponsor.

C. The Parties will expedite prompt exchange of information through symposia, exchange of personnel, setting up of combined teams, and other methods as may be mutually agreed.

D. Except as otherwise agreed, the application or use of any information (including designs, drawings and specifications) and any material, equipment, and devices, exchanged or transferred between the Parties under this agreement, shall be the responsibility of the Party receiving it, and the other Party

does not warrant the accuracy or completeness of such information, nor the suitability of such information, materials, equipment, and devices for any particular use or application.

ARTICLE VII

A. As to any invention made or conceived in the course of or under the joint program of research and development:

1. The Government of the United States of America shall without further obligation or payment be entitled to assignment of the title and rights in and to the invention and the patents in the United States subject to a nonexclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the Community for all purposes.

2. The Community shall without further obligation or payment be entitled to assignment of the title and rights in and to the invention and the patents in the Community subject to a nonexclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the Government of the United States of America for all purposes.

3. With respect to title and rights in and to the invention and patents in third countries:

a. The Community, if the invention is made or conceived within the Community, or the Government of the United States of America, if the invention is made or conceived within the United States, shall be entitled to assignment of such title and rights, subject to nonexclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the other Party for all purposes.

b. If the invention is made or conceived elsewhere, the Party contracting for the work shall be entitled to assignment of such title and rights, subject to a nonexclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the other Party for all purposes.

B. As to inventions and patents under paragraph A of this Article neither Party shall discriminate in the granting of any license or sublicense for the reason that the proposed licensee or sublicensee is a national of the United States or any Member State of the Community.

C. As to patents used in the work of the joint program, other than those under paragraph A, which the Government of the United States of America owns or as to which it has the right to grant licenses or sublicenses, the Government of the United States of America will agree to grant licenses or sublicenses, covering use either in or outside the joint program, on a nondiscriminatory basis to a Member State and to industry of a Member State, if the Member State has agreed to grant licenses or sublicenses as to patents used in the work of the joint program which it owns or as to which it has the right to grant licenses or sublicenses, on a nondiscriminatory basis to the Government of the United States of America and to industry of the United States, covering use either in or outside the joint program.

D. The respective contractual arrangements of the Parties with third parties shall contain provisions that will enable each Party to effectuate the provisions of paragraphs A and B of this Article as to patentable information.

E. It is recognized that detailed procedures shall be jointly established to effectuate the foregoing provisions and that all situations not covered shall be settled by mutual agreement governed by the basic principle of equivalent benefits to both Parties.

ARTICLE VIII

The United States Commission and the EURATOM Commission will work closely together to develop training programs to satisfy requirements of the joint program. The Parties may under mutually agreeable terms and conditions make available their facilities for use by the other, including facilities to satisfy training needs.

ARTICLE IX

The Government of the United States of America and the Community recognize that adequate measures to protect equipment manufacturers and other suppliers as well as the participating utilities against now uninsurable risks are necessary to the implementation of the joint program. The EURATOM Commission will seek to develop and to secure the adoption, by the earliest practicable date, of suitable measures which will provide adequate financial protection against third party liability. Such measures could involve suitable indemnification guarantees, national legislation, international convention, or a combination of such measures.

ARTICLE X

The EURATOM Commission will take all action open to it under the Treaty establishing the European Atomic Energy Community to minimize the impact of customs duties on goods and products imported under the joint program.

ARTICLE XI

The Community guarantees that:

1. No material, including equipment and devices, transferred pursuant to this Agreement to the Community or to persons within the Community, will be used for atomic weapons, or for research on or development of atomic weapons, or for any other military purpose;

2. No such material will be transferred to unauthorized persons or beyond the control of the Community, except as the Government of the United States of America may agree to such transfer and then only if the transfer of the material is within the scope of an Agreement for Cooperation between the Government of the United States of America and another nation or group of nations;

3. No source or special nuclear material utilized in, recovered from, or produced as a result of the use of materials, equipment, or devices transferred pursuant to this Agreement to the Community or to authorized persons within the Community will be used for atomic weapons, or for research on or development of atomic weapons, or for any other military purpose;

4. The Community will establish and maintain a mutually satisfactory system of safeguards and control as provided in Article XII, to be applied to materials, equipment, and devices subject to the guarantees set forth in paragraphs 1 through 3 of this Article.

ARTICLE XII

A. The Community undertakes the responsibility for establishing and implementing a safeguards and control system designed to give maximum assurance that any material, equipment, or devices made available pursuant to this Agreement and any source or special nuclear material derived from the use of such material, equipment, and devices, shall be utilized solely for peaceful purposes. In establishing and implementing its safeguards and control system, the Community is prepared to consult with and exchange experiences with the International Atomic Energy Agency with the objective of establishing a system reasonably compatible with that of the International Atomic Energy Agency. The Government of the United States of America and the Community agree that the principles which will govern the establishment and operation by the Community of a mutually satisfactory safeguards and control system under this Agreement are those which are set forth in Annex B to this Agreement. The Community shall be responsible for establishing and maintaining a mutually satisfactory and effective safeguards and control system which is in accord with the principles set forth in Annex B to this Agreement.

B. As has been requested by the Community, the Government of the United States of America will provide assistance in establishing the Community's safeguards and control system, and will provide continuing assistance in the operation of the system.

C. The Parties agree that there will be frequent consultations and exchanges of visits between the Parties to give assurance to both Parties that the Community's safeguards and control system effectively meets the responsibility and principles stated in paragraph A of this Article and that the standards of the materials accountability systems of the Government of the United States of America and the Community are kept reasonably comparable.

D. In recognition of the importance of the International Atomic Energy Agency, the Government of the United States of America and the Community will consult with each other from time to time to determine whether there are any areas of responsibility with regard to safeguards and control and matters relating to health and safety in which the Agency might be asked to assist.

E. It is understood by the Parties that a continuation of the cooperative program between the Government of the United States of America and the Community will be contingent upon the Community's establishing and maintaining a mutually satisfactory and effective safeguards and controls system which is in accord with the principles set forth in Annex B to this Agreement.

ARTICLE XIII

The Government of the United States of America and the Community reaffirm their common interest in fostering the peaceful applications of atomic energy through the International Atomic Energy Agency and intend that the results of the joint program will benefit the Agency and the nations participating in it.

ARTICLE XIV

A. The Parties anticipate that from time to time they may enter into further agreements providing for cooperation in the peaceful aspects of atomic energy.

B. Article 106 of the Treaty establishing the European Atomic Energy Community contemplates that Member States which before the date of entry into force of that Treaty have concluded agreements with third countries for cooperation in the field of nuclear energy shall jointly with the Euratom Commission enter into the necessary negotiations with third countries in order as far as possible to cause the rights and obligations arising out of such agreements to be assumed by the Community. The Government of the United States of America is prepared to enter into such negotiations with reference to any agreement to which it is a party.

C. Exisiting agreements for cooperation in the field of nuclear energy between Member States and the Government of the United States of America are not modified by the joint program. Modifications may be made as necessary by mutual agreement between the Member States concerned and the United States to permit transfers of reactor projects now contemplated under existing agreements that qualify for and are accepted under the joint program.

ARTICLE XV

For the purposes of this Agreement:

(a) "Person" means any individual, enterprise, corporation, partnerships, firm, association, trust, estate, public or private institution, group, government agency, or government corporation, but does not include the Parties to this Agreement.

(b) "Special nuclear material" means (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which either Party determines to be special nuclear material; or (2) any material artificially enriched by any of the foregoing.

(c) "Source material" means (1) uranium, thorium, or any other material which is determined by either Party to be source material; or (2) ores containing one or more of the foregoing materials, in such concentration as either Party may determine from time to time.

(d) "Parties" means the Government of the United States of America, including the United States Atomic Energy Commission on behalf of the Government of the United States of America, and the European Atomic Enery Community (EURATOM), acting through its Commission. "Party" means one of the Parties.

ARTICLE XVI

A. The Parties agree that the establishment and initiation of the joint program and the undertakings of the Parties under this Agreement are subject to appropriate statutory steps, including authorization by competent bodies of the Government of the United States of America and the Community, and the provisions of applicable laws, regulations and license requirements in effect in the United States and in the Community and within the Member States.

B. This Agreement shall enter into force on the day on which each Party shall have received from the other Party written notification that it has complied with all statutory and constitutional requirements for the entry into force of such Agreement and shall remain in force for a period of twenty-five (25) years.

IN WITNESS WHEREOF, the undersigned representatives duly authorized thereto have signed this Agreement.

DONE at_____ in duplicate, in the English, French, German, Italian and Netherlands languages, each language being equally authentic, this _____ day of _____, 1958.

For the Government of the United States of America:
Initialed on June 19, 1958, by

JOHN FOSTER DULLES.
LEWIS L. STRAUSS.

For the European Atomic Energy Community (EURATOM):
Initialed on May 29, 1958 by

LOUIS ARMAND.
HEINZ L. KREKELER.
EMANUEL SASSEN.
PAUL DE GROOTE.
ENRICO MEDI.

ANNEX A

With the objective of assuring the success of the joint program, the United States Commission will offer guarantees designed to limit certain financial risks associated with the fuel cycle.

These guarantees will be extended in the form of maximum charges for fabrication of the fuel elements and minimum integrity of the fuel elements under irradiation. They will be offered only to the extent that equivalent or better guarantees are not available commercially.

The liability of the United States Commission under these guarantees will be limited to meeting guaranteed maximum charges for fabricated fuel elements and to the adjustment of charges for fabrication, chemical reprocessing, and transportation of fuel elements when required by failure to meet guaranteed integrity.

The guarantees will provide for equitable sharing of decreases in costs realized through fuel performance in excess of guaranteed levels, the United States share not to exceed costs experienced by the United States Commission under these guarantees.

The guarantees provided by the United States Commission will be applicable to all loadings made in reactors under the joint program during ten years of operation or prior to December 31, 1973, whichever is earlier.

ANNEX B. PRINCIPLES FOR ESTABLISHING THE SAFEGUARDS AND CONTROL SYSTEM UNDER THIS AGREEMENT

The principles which will govern the establishment and operation of the safeguards and control system are as follows:

The EURATOM Commission will:

1. Examine the design of equipment, devices and facilities, including nuclear reactors, and approve it for the purpose of assuring that it will not further any military purpose and that it will permit the effective application of safeguards, if such equipment, devices, and facilities:

(a) are made available pursuant to this Agreement; or

(b) use, process or fabricate any of the following materials received from the United States: source or special nuclear material, moderator material or any other material relevant to the effective application of safeguards; or

(c) use any special nuclear material produced as the result of the use of equipment or material referred to in subparagraphs (a) and (b).

2. Require the maintenance and production of operating records to assure accountability for source or special nuclear material made available, or source or special nuclear material used, recovered, or produced as a result of the use of source or special nuclear material, moderator material or any other material relevant to the effective application of safeguards, or as a result of equipment, devices and facilities made available pursuant to this Agreement.

3. Require that progress reports be prepared and delivered to the EURATOM Commission with respect to projects utilizing material, equipment, devices, and facilities referred to in paragraph 2 of this Annex.

4. Establish and require the deposit and storage, under continuing safeguards, in EURATOM facilites of any special nuclear material referred to in paragraph 2 of this Annex which is not currently being utilized for peaceful purposes in the Community or otherwise transferred as provided in the Agreement for Cooperation between the Government of the United States of America and the Community.

5. Establish an inspection organization which will have access at all times:

(a) to all places and data, and

(b) to any person who by reason of his occupation deals with materials, equipment, devices, or facilities safeguarded under this Agreement, necessary to assure accounting for source or special nuclear material subject to paragraph 2 of this Annex and to determine whether there is compliance with the guarantees of the Community. The inspection organization will also be in a position to make and will make such independent measurements as are necessary to assure compliance with the provisions of this Annex and the Agreement for Cooperation.

It is the understanding of the Parties that the above principles applicable to the establishment of the Community's inspection and control system are compatible with and are based on Article XII of the Statute of the International Atomic Energy Agency, Chapter VII of Title Two of the Treaty establishing the European Atomic Energy Community, and those adopted by the Government of the United States of America in its comprehensive Agreements for Cooperation.

[H. R. 13119, 85th Cong., 2d sess.]

A BILL Authorizing appropriations for the use of the Atomic Energy Commission, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "EURATOM Cooperation Act of 1958".

SEC. 2. As used in this Act—

(a) "The Community" means the European Atomic Energy Community (EURATOM).

(b) "Joint program" means the cooperative program established by the Community and the United States to bring into operation in the territory of the members of the Community powerplants using nuclear reactors of proven types selected by the United States and the Community, having a total installed capacity of approximately one million kilowatts of electricity.

SEC. 3. There is hereby authorized to be appropriated to the Atomic Energy Commission, in accordance with the provisions of section 261 (a) (2) of the Atomic Energy Act of 1954, as amended, the sum of $50,000,000 for use in a program of research and development in connection with the types of reactors selected by the Commission and the Community under the joint program. The United States may enter into contracts for such periods as it deems necessary, but in no event to exceed five years, for the purpose of conducting the research and development program authorized by this section.

SEC. 4. There is hereby authorized to be appropriated to the Atomic Energy Commission, in accordance with the provisions of section 261 (a) (2) of the Atomic Energy Act of 1954, as amended, the sum of $90,000,000 for use in a program designed to assure that the charges to an operator, of a reactor constructed under the joint program, for fabricating, processing, and transporting fuel will be no greater than would result under the fuel fabricating and fuel life guarantees which the Commission establishes for such reactor. Within the limit of such amount, the Commission is authorized to make contracts under this section, without regard to the provisions of sections 3679 and 3709 of the Revised Statutes, as amended, for such periods of time as it determines to be necessary: *Provided, however,* That no such contracts may extend for a period longer than that necessary to cover fuel loaded into a reactor constructed under the joint program during the first ten years of the reactor operation or prior to December 31, 1973, whichever is earlier.

SEC. 5. Pursuant to the provisions of section 54 of the Atomic Energy Act of 1954, as amended, there is hereby authorized for distribution to the Community:

Thirty thousand kilograms of Contained U–235

One kilogram of Pu

in accordance with the provisions of an agreement for cooperation between the Government of the United States and the Community entered into pursuant to the provisions of section 123 of the Atomic Energy Act of 1954, as amended.

SEC. 6. The Atomic Energy Commission may enter into contracts in accordance with the terms of an agreement for cooperation with the Community entered into pursuant to the provisions of section 123 of the Atomic Energy Act of 1954, as amended, for such periods of time as the Commission may deem necessary or desirable, to provide for the processing, fabricating, separating or refining in facilities owned by the Atomic Energy Commission of source, byproduct, or other material or special nuclear material: *Provided, however,* That the charges for such services shall be no less than the then current published charges established by the Commission pursuant to section 161 m. of the Atomic Energy Act of 1954, as amended, for the performance of these services for persons licensed under section 103 or 104 of the Atomic Energy Act of 1954, as amended.

SEC. 7. (a) The Atomic Energy Commission is authorized to purchase or otherwise acquire from the Community special nuclear material or any interest therein in accordance with the terms of an agreement for cooperation entered into pursuant to the provisions of section 123 of the Atomic Energy Act of 1954, as amended: *Provided,* That neither plutonium nor uranium 233 nor any interest therein shall be acquired under this section in excess of the total quantities authorized by law. The Commisison is hereby authorized to acquire from the Community pursuant to this section up to four thousand one hundred kilograms of plutonium for use only for peaceful purposes.

(b) Any contract made under the provisions of this section to acquire plutonium or any interest therein may be at such prices and for such period of time as the Commission may deem necessary: *Provided,* That with respect to plutonium produced in any reactor constructed under the joint program, no such contract shall be for a period greater than ten years of operation of such reactors or December 31, 1973, whichever is earlier: *And provided further,* That no such contract shall provide for compensation or the payment of a purchase price in excess of the Commission's established price in effect at the time of delivery to the Commission for such material as fuel in a nuclear reactor.

(c) Any contract made under the provisions of this section to acquire uranium enriched in the istotope uranium 235 may be at such price and for such period of time as the Commission may deem necessary: *Provided,* That no such contract shall be for a period of time extending beyond the terminal date of the agreement for cooperation with the Community or provide for the acquisition of uranium enriched in the isotope U–235 in excess of the quantities of such material that have been distributed to the Community by the Commission less the quantity consumed in the nuclear reactors involved in the joint program: *And provided further,* That no such contract shall provide for compensation or the payment of a purchase price in excess of the Atomic Energy Commission's established charges for such material in effect at the time delivery is made to the Commission.

(d) Any contract made under this section for the purchase of special nuclear material or any interest therein may be made without regard to the provisions of section 3679 of the Revised Statutes, as amended.

(e) Any contract made under this section may be made without regard to section 3709 of the Revised Statutes, as amended, upon certification by the Commission that such action is necessary in the interest of the common defense and security, or upon a showing by the Commission that advertising is not reasonably practicable.

(f) Partial and advance payments or deliveries may be made under contracts authorized under this section.

SEC. 8. After having received an agreement for cooperation with the Community submitted pursuant to section 123 c. of the Atomic Energy Act of 1954, as amended, the Joint Committee on Atomic Energy may by resolution in writing waive the conditions of or all or any portion of the thirty-day period prescribed in such section.

EXCHANGE OF CORRESPONDENCE ON SAFEGUARDS PROVISIONS

JUNE 18, 1958.

MAX KOHNSTAMM, Esq.,
18 rue Aldringer, Luxembourg.

DEAR MR. KOHNSTAMM: As you are aware, in the course of the final negotiations on the text of the memorandum of understanding regarding the joint

nuclear power program proposed between the European Atomic Energy Community (Euratom) and the United States of America, the question was raised as to the intent of the parties regarding section 11D of the memorandum. Section 11D provides for frequent consultation and exchanges of visits between the parties to give assurance to both parties that the Euratom safeguards and control system effectively meets the responsibility and principles for the peaceful uses of atomic material stated in the memorandum and that the standards of the materials accountability systems of the United States and Euratom are kept reasonably comparable.

I wish to confirm the undesrtanding of my Government that the consultations and exchanges of visits agreed upon in the referenced section and the assurance provided for therein include within those terms permission by each party for the other party to verify, by mutually approved scientific methods, the effectiveness of the safeguards and control systems applied to nuclear materials received from the other party or to fissionable materials derived from these nuclear materials. In the Commission's judgment, this understanding is implicit in the text of the memorandum of understanding.

I wish further to confirm my Government's understanding that with respect to section 11E, in the event of the establishment of an international safeguards and control system by the International Atomic Energy Agency, the United States and Euratom will consult regarding assumption by that Agency of the safeguard and control over the fissionable material utilized or produced in implementation of the program contemplated by the memorandum of understanding.

Sincerely yours,

AMBASSADOR BUTTERWORTH.

JUNE 18, 1958.

His Excellency Ambassador W. WALTON BUTTERWORTH,
United States Representative to the European Atomic Energy Community, Luxembourg.

DEAR MR. AMBASSADOR: As you are aware, in the course of the final renegotiations on the text of the memorandum of understanding regarding the joint nuclear power program proposed between the European Atomic Energy Community (Euratom) and the United States of America, the question was raised as to the intent of the parties regarding section 11D of the memorandum. Section 11D provides for frequent consultation and exchanges of visits between the parties to give assurance to both parties that the Euratom safeguards and control system effectively meets the responsibility and principles for the peaceful uses of atomic material stated in the memorandum and that the standards of the materials accountablity systems of the United States and Euratom are kept reasonably comparable.

I wish to confirm the understanding of the Euratom Commission that the consultations and exchanges of visits agreed upon in the referenced section and the assurance provided for therein include within those terms permission by each party for the other party to verify, by mutually approved scientific methods, the effectiveness of the safeguards and control system applied to nuclear materials received from the other party or to fissionable materials derived from these nuclear materials. In the Commission's judgment, this understanding is implicit in the text of the memorandum of understanding.

I wish further to confirm the Commission's understanding that with respect to section 11E, in the event of the establishment of an international safeguards and control system by the International Atomic Energy Agency, the United States and Euratom will consult regarding assumption by that Agency of the safeguard and control over the fissionable material utilized or produced in implementation of the program contemplated by the memorandum of understanding.

Sincerely yours,

MAX KOHNSTAMM.

Chairman DURHAM. This morning the committee will hear from representatives of the State Department who will give us their views on the proposed agreements and tomorrow morning we will receive the views of the Atomic Energy Commission. The following day, Thursday, has been set aside for public witnesses who may wish to appear personally before this committee or submit statements for the record.

As you know the Joint Committee has directed a series of questions to the State Department, Atomic Energy Commission, and industrial experts which are intended to raise the major policy issues in the Euratom proposal. I hope these hearings and those that follow will clarify these issues and I hope will also clarify some of the statements in newspapers in this country that this committee has lagged in trying to get these hearings underway.

I understand that Ambassador Dillon, Under Secretary of State for Economic Affairs, will make the major presentation for the State Department this morning and that other representatives of the State Department staff are present to answer any detailed questions which may arise.

Senator Anderson, do you have any opening statement you wish to make?

Senator ANDERSON. I merely want to say Mr. Chairman, that I regret that there have been some editorials referring to this committee as stalling on Euratom. One in particular is in the Washington Post. It does not single out anyone. I notice in the New York Times of yesterday a story under the heading "Random Notes on Washington," which indicates that the papers with respect to this particular subject matter were on Mr. Morgan's desk, and then it tells how it stayed on Mr. Morgan's desk for days and days and days, and I hope that delay is not charged against the Joint Committee.

I would also call attention to the fact that I believe it was May 29 when the European Atomic Energy Commission signed these papers and they got to our committee on June 23. I know that there was some discussion over a single item of security but it seems to me that the rest of the question could have been submitted to the Joint Committee so we could have had a chance to consider them before we get into this last rush period before adjournment. I only want to say if there is a continued discussion of stalling, I think it would be a good plan for the Joint Committee to have hearings as to how this got stalled 2 or 3 times in Europe, 5 weeks at one stretch, and find out what the difficulties were. It is pretty late, Mr. Secretary, to get a matter of this importance that could involve several hundred million dollars and be told we took so much time on it that we folks will have to hurry up and then to get some editorials to indicate that it is our fault. I think it is going a little too far.

Chairman DURHAM. Ambassador Dillon, will you proceed with your statement?

STATEMENTS OF AMBASSADOR C. DOUGLAS DILLON, UNDER SECRETARY FOR ECONOMIC AFFAIRS; PHILIP J. FARLEY, SPECIAL ASSISTANT TO THE SECRETARY FOR DISARMAMENT AND ATOMIC ENERGY; J. ROBERT SCHAETZEL, OFFICE OF SPECIAL ASSISTANT TO THE SECRETARY FOR DISARMAMENT AND ATOMIC ENERGY; STANLEY METZGER, ASSISTANT LEGAL ADVISER FOR ECONOMIC AFFAIRS; B. E. L. TIMMONS, DIRECTOR, OFFICE OF EUROPEAN REGIONAL AFFAIRS; AND WILLIAM CHAPIN, OFFICE OF MR. FARLEY

Mr. DILLON. Thank you, sir.

I should like to express at the outset of my statement the regret of the executive branch at the late date at which this program has

been submitted to the Congress. The schedule, unfortunately, was beyond our control. The new Community did not come into existence until January 1, 1958; it was born without a staff and further labored under the difficulty that M. Armand, the Euratom President, fell ill and only recently returned to active duty with the Commission.

However, in something over 4 months an almost miraculous job has been done by the new Community in gathering a staff and in organizing its resources which enabled the Community to work effectively and quickly with the United States in developing the comprehensive joint program now before the committee. As the President stated in his message to the Congress, both the Department of State and the Atomic Energy Commission consider it of the greatest importance that the program be acted upon affirmatively by the Congress prior to the adjournment this summer. In subsequent testimony, the Department of State and Atomic Energy Commission representatives will endeavor to make clear why urgent action is necessary to maintain the momentum which has now been developed in Europe.

A striking aspect of the joint program is the combination of practical and political appeal. The fundamental strength of the program is that it is rooted in the benefits to the enlightened self-interest of both parties. The element of self-interest is not to be excused; it is a guaranty that the program will lay the basis for healthy and fruitful cooperation between America and Europe in the atomic energy field.

The agreement represents the confluence of two important historic developments: First, the peaceful application of atomic energy, a policy high among the objectives of this Government; second, European unity, a result of European inspiration and a development on which the United States has looked with great interest and favor. Certainly, bearing in mind our own history with the unification of the Thirteen Colonies in the 18th century, what American can be unresponsive to the gradual process unfolding in Europe and the movement to amalgamate the great strength and historic traditions of the six countries?

There are, of course, specific advantages of special interest to the United States. The representatives of the Atomic Energy Commission will speak to the significant advantages we, and particularly American industry, will gain from this large-scale, cooperative effort to harness the atom for the production of economical nuclear energy. In this connection, Euratom is unique in having a political status, including certain of the sovereign attributes of the state, which permits us to deal with it bilaterally. Combined with this political status is the scientific, industrial, and financial potential of six of the most developed nations in Europe. The successful implementation of the program will help maintain Western leadership in the peaceful uses of atomic energy. The continuing attacks on Euratom by the Soviet Union would seem to indicate that they draw the same conclusion.

The higher conventional fuel costs in Europe than in the United States mean that atomic power will be economic in Europe before it is in the United States. United States progress in reactor research and development makes it possible and advantageous for us to collaborate with the Europeans in this program. The instruments for this

collaboration are United States industry and European industry interested in embarking upon the production of nuclear components, both working with European utilities. Out of this program there may be expected to grow mutually beneficial licensing arrangements between these industries; scientists and engineers from both Europe and America will gain from intimate association in this major development program.

The European desire to have six reactors in operation before 1963 means that heavy demands will be made on United States atomic energy industry to supply specialized reactor components. It should be stressed that all of the information developed from the joint research and development program will be freely available on a nonexclusive basis both to United States and European industry. The joint program should be a major factor accelerating atomic power development.

Over the last 10 years, both the executive and the congressional branches have expressed the sympathetic interest of the United States in European efforts to develop unity. The integration movement among the six has been looked upon as the most promising method to exploit the great economic and political energies of this area. Politically, within the Atlantic Community, unity of the six nations will strengthen the ties with the United States and make possible programs on a scale which individually the nations could not attempt. The economic potential of linking the countries of this area in the three communities, the Coal and Steel Community, the Common Market, and the Euratom Community, is recognized by all.

Euratom, with its interest in rapidly developing a nuclear power program, presents a unique opportunity for the United States to work in intimate association with Europe and to bring to bear the scientific, industrial, and financial resources of both the Community and the United States on a program which is sure to benefit the Community, the United States and ultimately the entire world. The nature of the program permits Euratom and the United States to enter into a special association—a joint endeavor to the end of a mutually beneficial interdependence utilizing efficiently the great latent resources of the Atlantic area more effiectively to meet the Soviet challenge.

As can be seen, the foregoing virtues of the program are by no means exclusively ours, but of equal significance to the Europeans. But there are certain factors of more immediate significance to the Europeans. One of the most important is that the program will enable the Europeans to augment their present atomic energy efforts and to take full advantage of the progress which has already been made in the United States, especially with reference to proven types of power reactors, and hence save much valuable time. The progress which will be made from this moment on, although of benefit to both sides, will be of immediate benefit and gain to Europe because of their mounting shortage and rising cost of conventional fuels.

There is one other aspect of this matter that is of great importance to Western Europe. The closing of the Suez Canal and the interruption in the pipelines from Iraq last year brought sharply home to Western Europe the extent of their dependence on Middle East oil. Thanks to a large-scale increase in deliveries from the Western Hemisphere, European industry was able to continue operating without any

excessive ill effects. However, the outlook for the future indicated that as European demand for energy grew, their dependence on Middle East oil would also increase. In order to give themselves increased flexibility the Euratom countries quite naturally decided to try and cover a portion of the increase in their energy requirements from an alternative source of energy, nuclear power.

The events of the past week have highlighted the importance of this aspect of the Euratom program. A strong nuclear power industry in Europe should have the effect, through providing an alternative source of energy, of lessening the temptation to manipulate petroleum deliveries for political reasons, and should thereby help to lay the groundwork for a healthy and normal relationship between petroleum supplier and petroleum consumer. The current crisis in the Middle East is surely dramatic evidence of Europe's urgent need to develop nuclear power.

Recently demonstrated evidences of advanced Soviet scientific and engineering capability have caused a serious and healthy reappraisal within the Atlantic Community of the extent to which the Western countries have been exploiting to the full their potential scientific strength and whether this strength is being mobilized through the most effective cooperative arrangements. Voices in Europe have queried whether the historic position of the United States in the field of science, engineering, and general industrial development, is not being overtaken by the Soviet Union. Atomic energy is rightfully considered a bellwether of scientific and industrial accomplishment.

Rapid progress on a major program of the scope and character outlined in the documents before the committee will do much to dispel this questioning attitude, and furthermore, will lay the foundation for the kind of meaningful scientific cooperation which is indispensable to the survival of the West.

In conclusion, I should like to note that a great deal of the work of carrying out our policy involves the drudgery of the known and of the routine, improving upon or doing better with accepted policies and programs. However, in the case of the joint United States-Euratom program, we are striking out along new lines and taking full advantage of the great, but only barely exploited, promise of atomic energy. We have, therefore, under this program, the opportunity to employ our own substantial interests and industrial capacity in a joint endeavor which promises to enhance our position in Europe, increase their economic strength in a crucial area and at the right time, and to do this in a spirit of cooperation and trust which is the hallmark of the inner strength and future of the Atlantic Community.

Mr. Chairman, I also have a more detailed statement on the safeguards provisions of the act as far as the State Department is concerned with them, and I would like to submit that for the record at this time or be glad to read it if you feel that would be advisable. (See p. 83.)

Chairman DURHAM. I think there might be some questions on that. Suppose we finish with the questions on your statement and then take that up later.

Supplementing what I said in the beginning, I think the committee has familiarized itself with this problem for a good long time. The committee last year visited practically every Euratom country and

went into the power situation in their report. I might say we saw the need for this type of energy, which would supplement what they have at the present time.

When you were reading on page 2 of your statement, you said:

Continuing attacks on Euratom by the Soviet Union would seem to indicate that they draw the same conclusion.

Would you elaborate on that?

Mr. DILLON. We have here some excerpts from Soviet-bloc statements at the International Atomic Energy Agency Governing Board session which was devoted to a discussion of whether or not to invite Euratom to be a nongovernmental associate and send observers to Agency meetings. Such an arrangement was finally adopted, over the opposition of the Soviet Union.

We have a whole series of their statements attacking Euratom, which they equate with NATO. I would be glad to submit those in detail for the record.

Chairman DURHAM. Will you submit these for the record, because I think they are important? Without objection, they will be included in the record.

(The document referred to follows:)

EXCERPTS FROM SOVIET-BLOC STATEMENTS IN IAEA GOVERNING BOARD SESSION DISCUSSING EURATOM INVITATION

Mr. Zamyatin (Union of Soviet Socialistic Republics) thought it reasonable to send invitations to the four organizations mentioned in paragraph 5 of the Director General's memorandum. On the other hand, his delegation had serious doubts about the advisability of sending a similar invitation to the European Atomic Energy Community (EURATOM), which was mentioned in paragraph 1.

The Agency had been established to deal only with the peaceful uses of atomic energy, and the Director General himself had stated clearly that the Agency could never deal with its military aspects, since that would be contrary to the Statute; hence, it would be wrong to send invitations to any organization concerned partly or wholly with research on the military uses of atomic energy. While it was true that Euratom was not exclusively concerned with military uses, it was clear from articles in the press at the time of its establishment, and in particular from statements made in the French National Assembly, that its aims were not entirely peaceful. It would, therefore be a gross violation of the Agency's Statute to invite an observer from Euratom. If the Board decided to do so, the U. S. S. R. delegation at the second session of the General Conference would be obliged to challenge the observer's right to attend.

He pointed out that those countries of Western Europe that had established Euratom were also members of the European Nuclear Energy Agency of the Organization for European Economic Cooperation (OEEC), and would therefore, be adequately represented by an OEEC observer.

Mr. Emelyanov (Union of Soviet Socialist Republics) said that if the Board of Governors issued an invitation to Euratom, it would be setting a dangerous precedent and, moreover, would necessarily involve the Agency in bitter political discussions. For the U. S. S. R. delegation would then have no choice but to uphold its views on the matter at the General Conference itself. No arguments could conceal the military nature of Euratom; that could be clearly seen from the control system for which the Treaty establishing Euratom provided.

It was erroneous to attempt to draw a parallel between Euratom and the Joint Institute for Nuclear Research. The latter had never produced, did not now produce, and would never produce plutonium or uranium 235, nor did it own a single gramme of material that could be used for atomic bombs; on the other hand, it was Euratom's main task to produce fissionable materials. It was true that such materials could be used for peaceful purposes, but that was not Euratom's principal aim.

The political discussion which had been forced upon the Board had seriously endangered the unity that had been maintained throughout the work of the Preparatory Commission and of the Agency so far. To invite an observer from Euratom to attend the General Conference would be as serious a danger to the Agency, and would mean as radical change in its atmosphere, as would be a similar invitation to the North Atlantic Treaty Organization (NATO).

Mr. Brazda (Czechoslovakia) said that, according to the Statute—Article II, III A 5, and particularly III B 1—the main function of the Agency was to prevent atomic energy from being used for other than peaceful purposes. Euratom, however, was concerned with nonpeaceful uses, as was clear from the provisions of Articles 2 E, 24 (1), and 84 (3) of the Treaty by which it had been established. Accordingly, he strongly opposed the proposal that Euratom be invited to send observers to the General Conference.

On the other hand, he supported the proposal of the Governor from the Soviet Union that an invitation be extended to the regional economic commissions of the United Nations.

Mr. Emelyanov (Union of Soviet Socialist Republics) said that he deeply regretted that the harmony which had hitherto obtained in the Agency had been disturbed by the attitude adopted by certain Governors with regard to the proposed invitation to Euratom. He urged the Director General to try to persuade them to adopt a different attitude; should they persist in their present attitude, he would be obliged to raise the matter at the General Conference.

[Soviet News—Published by the Press Department of the Soviet Embassy in London—No. 3591, Monday, March 18, 1957]

PLANS FOR THE ESTABLISHMENT OF EURATOM AND THE COMMON MARKET

(Statement by U. S. S. R. Foreign Ministry at press conference on March 16)

At the present time, the governments of France, the Federal Republic of Germany, Italy, Belgium, the Netherlands, and Luxembourg are preparing to set up in Western Europe two new exclusive organisations, namely, the atomic-energy "community" of these six countries (the so-called Euratom) and the "Common Market," within the framework of which they plan the gradual removal of customs tariffs which are protecting the economy of every one of these countries, the "free" movement of labour and capital, and the joint exploitation of French, Belgian, and Dutch colonial possessions.

In view of the fact that plans for the creation of Euratom and the Common Market, which raise problems which are of importance to all European countries—those of economic cooperation and cooperation in the use of atomic energy—and entail steps which are found to lead to effects endangering the peoples of Europe, the Soviet Ministry of Foreign Affairs is authorized to state the following:

The Soviet Union has always favoured and continues to favour the all-around development of international economic cooperation, and particularly in the peaceful use of atomic energy, because it considers that such cooperation is in the interests of all countries, strengthens trust among the peoples, and creates a firm basis for the peaceful coexistence of states.

The Soviet Union is of the opinion that the establishment of such cooperation in Europe on an all-European basis is of especial importance, since it would be instrumental in overcoming the division of Europe into two opposing military groups, which is the result of the policy of the western powers, and would help to consolidate peace in Europe.

The development of the peaceful uses of atomic energy in European countries on a large scale would open up favourable prospects for the development of the economy, science, and culture and improve the welfare of the peoples. The use of the great possibilities opened up by the peaceful application of atomic energy naturally demands the establishment of the necessary production, scientific, and technical facilities and the joint efforts of states in organising large-scale industrial production of nuclear energy. That is why the Soviet government takes cognisance of the desire of various European states, particularly those which lack sufficient resources and technical experience, to work in this sphere, to unite their efforts and potential in the peaceful use of nuclear energy, and make use of the experience accumulated by other countries.

The Soviet government likewise understands the concern of European countries in organizing broad economic cooperation in every other sphere. The extension of economic cooperation between European countries would be very beneficial to the development of their economies, to increased employment and to a higher standard of living, and would have a positive effect on the world economic situation as a whole.

Economic cooperation on a European basis would help to reestablish the disrupted traditional trade and scientific and technical connections, and to overcome the artificial barriers and restrictions in trade and other economic relations, and would bring the European countries closer to one another, strengthening their sense of security and confidence in the future.

However, the plans for creating Euratom and the Common Market are in manifest contradiction with these aims. The first thing that strikes the eye is that all those taking part in Euratom and the Common Market are members of the military NATO grouping. It is obvious that the activities of Euratom and the Common Market will be subjugated to NATO aims, the aggressive character of which is widely known.

Under the circumstances the creation of Euratom and the Common Market would inevitably lead to a further widening of the rift in Europe, to an aggravation of tension in Europe, would complicate the establishment of economic and political cooperation on a European basis and give rise to fresh difficulties in the solution of the problem of European security.

New and grave obstacles would also arise on the road to reestablishing the national unity of the German people since Western Germany will be increasingly drawn into the system of exclusive military blocs of western powers opposed to other European states. In this connection it should be recalled that Ollenhauer, the chairman of the Social Democratic Party of Western Germany, expressed understandable anxiety on behalf of his party in a statement on March 6, when he pointed out a number of dangerous consequences for the German people arising from Euratom and the Common Market plans.

The assertions of some West European leaders that Euratom and the Common Market would deal only with questions concerning the peaceful cooperation of their member states are nothing more than a veil to cloak the real schemes of their organizers and sponsors. It should not be forgotten that certain circles in the United States who are actively supporting Euratom are working for the speediest rebirth of German militarism and the equipping of the West German Army now being created with all types of modern weapons, including nuclear weapons. Such a decision, it will be recalled, was adopted by the NATO Council session in December 1956 at the suggestion of the United States.

The creation of Euratom will be a practical step in the realization of these aggressive plans which spell danger for the peoples.

There is no doubt that the revenge-seeking West German groups will not fail to utilize Euratom for stockpiling fissionable materials in order to start producing their own nuclear weapons as soon as possible. In this way the creation of Euratom will pave the way for German militarism to prepare new military gambles. A dangerous center of disquiet will emerge in the heart of Europe. In this connection, however, it should be stressed again that the equipping of the West German Army with nuclear weapons is fraught with grave consequences for the population of Western Germany above all, since it may become the target of a retaliatory atomic blow.

The hopes of the ruling circles of certain West European countries of utilizing Euratom as a means to control the production of nuclear energy in Western Germany are entirely without foundation. It is well known that when the European Coal and Steel Community was set up, the French government, in its efforts to get the French Parliament to ratify the treaty, likewise declared that the community would serve to control the military and industrial potential of Western Germany. In its efforts to secure the ratification of the Paris agreements the French government asserted that these agreements would be a means of military control over Western Germany. It is now evident to all that these calculations have proved to be illusory. The creation of Euratom—willy-nilly—will inevitably lead to the removal of all restrictions in the production of nuclear weapons in Western Germany, which will create a direct threat to the French people as well as to the peoples of other West European countries.

The hopes of certain French, Italian, and other West European circles that the creation of Euratom would lessen their economic dependence on the United States are equally groundless. On the contrary, their dependence on the United States would increase to the detriment of the national sovereignty of the par-

ticipants in that grouping, since the United States—and this is no secret—will actually control Euratom as the chief supplier of fissionable materials and equipment for the atomic industry of Euratom countries. It is no accident that influential circles in Britain declare themselves to be against Britain's accession to Euratom because they realize the consequences of such a step.

The Common Market plan, too, is a grave menace to the peoples of Europe. Its implementation would mean that the economically stronger countries and, in effect, appropriate big monopolies would be able to impose their terms on the weaker European countries in both the Common Market and Euratom, to the detriment of their vital national interests. Not even the most rabid champions of the Common Market plan deny that it is the West German monopolies that stand to gain most from it. It would be useful to recall in this connection that the European Coal and Steel Community, set up earlier by the same six countries, is already dominated by the West German monopoly concerns to the detriment of its other members. There can be no doubt that the establishment of the Common Market would subordinate France and other West European countries to German monopolies economically, disarming them in the face of West German militarists and revenge seekers.

All these plans cannot but alarm the peoples, including the peoples in Western Germany where there are forces opposing these plans, rightly fearing the consequences that their implementation might entail for Western Germany.

Some shortsighted West European policymakers pretend that the establishment of the Common Market would place its participants on a footing of equality in their economic relations with the United States.

The groundlessness of these contentions, however, becomes obvious once we consider the facts.

It is common knowledge that American capital has further penetrated the economy of France, Western Germany, Italy and other West European countries in the postwar years. Scores of branch and daughter companies of the largest American monopolies and corporations, such as General Motors, Ford, Standard Oil and Dupont de Nemours, are now active in every one of these countries. It is obvious that American monopolies and corporations are using the Common Market in their own intersets and to the detriment of the national industries of France, Italy and the other member countries. No one can dispute the undeniable fact that advantages and profits in the capitalist world are distributed according to the strength of the competitors, which is determined by the extent of the capital, and this strength is on the side of the big American and West German monopolies first and foremost.

The French advocates of the Common Market, in their efforts to push the plan through and to ensure its approval by the French Parliament, declare that its establishment would conform to the interests of the French people. Things are different in reality, however. The French Common Market champions are glossing over the fact that in joining this community France would lose freedom of action in her trade relations not only with her market partners but with other countries as well, since these relations would be regulated by the Common Market governing bodies, and consequently by its strongest members. It is noteworthy that influential circles in Britain and some other European countries have no illusions about the consequences that their participation in the Common Market would entail.

In Italy, the advocates of the Common Market contend that its establishment would create favourable conditions for resolving the problem of chronic unemployment which, according to official data, amounts to more than two million in that country. It is highly probable that the Italian government will indeed try to get rid of a part of the unemployed by sending them to other Common Market countries. Is it possible, however, to disregard the fact that these Italians, as experience shows, would be used there in the most arduous, dangerous and low-paid occupations and would be at the complete mercy of German and other foreign monopolies? One can hardly call it a solution of the unemployment problem in Italy if the well-being of two million Italians were made dependent on the demand for them abroad.

The sponsors of the Common Market are misleading public opinion when they allege that it will raise the living standards of the peoples of the member countries. It is well known that the plans of the big monopolies, far from being prompted by concern for the living standards of the people, are dictated by the narrow interests of obtaining big profits. The proposed abolition of customs duties within the Common Market would benefit only the biggest monopolies, giving them additional profits. With the competitive struggle

growing more acute in the Common Market, the lifting of customs duties can only lower the living standards of the people, particularly the working class, since the monopolies will try to overcome all the difficulties created by this competition by plundering the working people, raising taxes, increasing prices of consumer goods, etc.

The question presents itself: Who stands to gain from the Euratom and Common Market plans? Why are these plans being pushed forward? Who expects to benefit from them? Do these plans conform to the interests of those who are seeking to strengthen peace and security in Europe, to improve the international situation, to raise the living standards of the working people of the European countries? There can be only one answer: These plans are designed to serve the interests of the western circles which want to supply West German revenge seekers with nuclear weapons, aggravate the relations between European countries, raise new obstacles to peace and security in Europe, and further complicate the reestablishment of the national unity of the German people. They are designed to serve the interests of those who are seeking to deprive France and other West Euopean countries of their national sovereignty, to make their economy dependent on West German monopolies and to hamper the establishment of general European economic cooperation.

The Soviet Union is convinced that a genuine solution of the economic problems affecting each European country as, indeed, a solution of the problem of the economic cooperation of the European countries and their cooperation in the sphere of the peaceful uses of atomic energy, cannot be found through the establishment of new exclusive organizations by this or that group of countries opposed to other European countries.

This solution can and should be found on an all-European basis through the use of the already existing organizations of an all-European nature or through establishment of new European organizations on terms acceptable to all European countries regardless of their social system.

Proceeding from this, the Soviet Union has already made a number of proposals toward the establishment of genuine all-European cooperation:

1. In April 1956 the Soviet Union proposed at the 11th session of the United Nations Economic Commission for Europe that an agency for the peaceful application of atomic energy be established within its framework. This motion has been included in the agenda of the 12th session of the United Nations Economic Commission for Europe opening on April 29 this year.

In its statement on all-European cooperation in the peaceful uses of atomic energy of July 12, 1956, the Soviet government proposed that a conference of European countries be called to consider the establishment of an all-European organization for the peaceful uses of atomic energy, having in mind that this organization is to be a regional branch of the International Atomic Energy Agency. This organization, the Soviet government believed, might be established on an intergovernmental basis with the participation of all European countries wishing to do so, and also the United States of America.

The European regional organization for the peaceful uses of atomic energy proposed by the Soviet Union would not be directed against any state or group of states whatsoever, and would not infringe on any national interests.

Cooperation within the framework of an all-European regional atomic energy organization would, unquestionably, contribute to the progress of every European country in the peaceful uses of atomic energy and help raise the living standards of the European peoples, besides being an important means of improving the European situation in general.

The establishment of all-European cooperation in the peaceful uses of atomic energy would greatly contribute to the solution of a pressing issue of our time—the banning of atomic and hydrogen weapons as weapons of mass destruction.

Guided by a desire to promote a positive solution of the problem of all-European cooperation in the sphere of the peaceful uses of atomic energy, the Soviet government proposes that the following questions bearing on the problem be discussed:

(a) Establishment of an atomic energy research institute or institutes on an all-European basis.

(b) Cooperation in the building of establishments for the generation of atomic energy for industrial, scientific, and technical purposes, including questions concerning the provision of raw materials to these establisments.

It goes without saying that in developing all-European cooperation in the peaceful uses of atomic energy, the European countries will be able to make use of the appropriate experience of the Soviet Union.

2. With regard to the question of all-European economic cooperation, the Soviet government submitted at the same 11th Session of the United Nations Economic Commission for Europe in April 1956, a proposal to conclude an all-European agreement on economic cooperation, providing for the establishment of more favorable conditions for the development of European trade and cooperation in the sphere of transport, scientific and technical cooperation, and the exchange of production experience. A draft agreement supported by the Soviet government will likewise be considered by the 12th Session of the Economic Commission for Europe.

The Soviet government now proposes that the following questions be considered additionally:

(a) Cooperation in the construction of large hydroelectric power stations of interest to several countries, with their consent and participation.

(b) Cooperation in the development of Europe's fuel resources and power resources with a view to easing the strain on the fuel resources of many European countries.

(c) Conclusion of an agreement between all interested European countries on measures for promoting trade between them.

(d) Mutual economic and financial assistance by countries to promote their economic development.

The Soviet government is prepared to consider any other proposal concerning the principles and forms of economic cooperation and cooperation in the peaceful application of atomic energy.

The U. S. S. R. government believes that the aforementioned proposals on questions of all-European economic cooperation and cooperation in the sphere of the peaceful uses of atomic energy can be considered by the 12th Session of the United Nations Economic Commission for Europe.

The Soviet government hopes that the governments of all countries concerned will give due attention to the Soviet Union's proposals on the question of all-European economic cooperation and cooperation in the sphere of the peaceful uses of atomic energy.

On March 16 the Foreign Ministry's statement was sent to the Embassies and Legations of the European countries and the American Embassy in Moscow, and also to the Executive Secretary of the United Nations Economic Commission for Europe.

Senator ANDERSON. I was wondering about that also. "Continuing attacks on Euratom by the Soviet Union." This question of admitting Euratom to the International Agency was hardly an attack on the principle of Euratom.

Mr. DILLON. I think it was, sir. There is also included in that a long press statement by the Soviet Foreign Ministry in Moscow on March 16 attacking Euratom. That will be included.

Senator ANDERSON. It was not given very wide circulation. I did not see it in the newspapers.

Mr. DILLON. It may not have been in our newspapers.

Senator ANDERSON. Was it circulated in the Euratom countries to any degree?

Mr. DILLON. I think it was.

Senator ANDERSON. I wonder if this was thrown in here because if any one of us opposed this, the inference would be that we are for the Soviet Union?

Mr. DILLON. No, sir.

Senator ANDERSON. When our Government switched and wanted to have a test suspension there was no attempt to take the smear off us. You don't just put this in here for that reason?

Mr. DILLON. No; I think this is just another sign of what the Soviet has done for a long time, which is to oppose any move toward European unity and they particularly oppose this as one of the concrete moves in that direction.

Senator ANDERSON. In the first page you say, "It is of greatest importance that the program be acted upon affirmatively by the Congress prior to the adjournment this summer." There have been statements made that we would adjourn on August 8 or 9. Do you think that gives us plenty of time to do all the things required to act affirmatively?

Mr. DILLON. I don't think that is for me to judge.

Senator ANDERSON. You bring it to us and say we expect you to act affirmatively. Is there anybody else at fault in case we don't act affirmatively?

Mr. DILLON. These documents were submitted in detail about a month ago and we had hoped that gave ample time for the committee staff to study them and make a detailed analysis of them so that your committee might be able, we hope, to act promptly.

Senator ANDERSON. How long did the State Department study them?

Mr. DILLON. We were engaged in this complex negotiation with Euratom—I think it ended its active phase sometime in April, and came to an end at the end of May, with the exception of a final complete understanding on certain of the language regarding safeguards. That was finally achieved on the 19th of June.

Senator ANDERSON. Did the safeguards enter into the question of how much material would be supplied to them? Couldn't that have been submitted to the Joint Committee in March after it was settled?

Mr. DILLON. At the end of May.

Senator ANDERSON. You had that part settled in March, didn't you?

Mr. DILLON. I don't know the facts of that.

Senator ANDERSON. No part of this was determined in March. It has all been changed since March?

Mr. FARLEY. Senator, the various parts of the agreement, it is true, have been worked out provisionally over the period of the negotiations. However, in view of the provisions of the Atomic Energy Act the safeguards arrangements are an integral part of the agreement and we could not present the thing formally to the Congress until that among other parts was worked out.

Senator ANDERSON. You had to wait until the whole package was finished before you could submit any part of it?

Mr. FARLEY. Before we could formally submit it.

Senator PASTORE. What is the difference in the agreement reached in the latter part of May and the one in March?

Mr. DILLON. There was no difference in the agreement itself. There were merely letters of explanation which clarified certain aspects that there might possibly have been misunderstanding about.

Senator PASTORE. As a matter of fact, it was agreed tentatively that you would recognize the sovereignty of the Euratom negotiations at the conclusion of the negotiations in the latter part of May?

Mr. DILLON. That is right.

Senator PASTORE. And when you concluded on June 19 you have just an acting system which is just as good and means the same thing?

Mr. DILLON. That is right.

Senator PASTORE. You have had a lapse there almost a month unnecessarily. I want to say this to you, Mr. Secretary, I agree with everything you say. I wholeheartedly agree with you on the eco-

nomic, political, and diplomatic implications involved in this agreement and what it means mutually not only to us but to the six nations of Euratom. I was one of the committee that suggested we hear this before the whole committee because this would ordinarily come under my subcommittee and I suggested it only because we wanted to expedite it.

If we went before a subcommittee and have to do it all over again before a full committee we would have wasted more time. Here is an agreement that came here on June 23, if I remember correctly, and by every rhyme and reason according to law we are supposed to adjourn Congress by July 31 unless we continue by mutual consent of both branches of Congress.

It took you so long to bring about this agreement where there should have been an understanding a long time ago, and a month was wasted that I know of at least. Of course, there are many ramifications and conflicts involved in this agreement. I do hope that the rest of the members of the committee will see it as I see it because I think it is a fine agreement. But again other people have their own point of view and they have a right to discuss it fully.

I agree with the distinguished Senator that we have done all that we could. Here it is with all the business that we have had before our Joint Committee, we are holding these hearings in public session before the full committee on this the 22d day of July.

Mr. DILLON. I can only say we have no fault to find whatsoever with the committee's action in scheduling these hearings, and repeat what I said at the opening of my statement, and emphasize it, that we regret the delay in submitting these things to the committee.

Chairman DURHAM. Will the Senator yield?

Senator ANDERSON. Yes.

Chairman DURHAM. I believe this idea was born in 1957, although I don't remember the exact date.

Mr. DILLON. Yes, sir; but Euratom itself was then not yet in existence and had not been ratified by the European countries.

Chairman DURHAM. We held discussions in the committee over a year ago with the group that came to see us.

Mr. DILLON. They were an advanced group that would have something to do with it once it was established.

Chairman DURHAM. On May 7, 1957?

Mr. DILLON. The Euratom Community actually came into being on the 1st of January 1958.

Chairman DURHAM. I want to include in the record a statement by Mr. Strauss at that time. May 7, 1957, and without objection it will be inserted at this point, together with a report by the "Three Wise Men" entitled "A Target for Euratom."

(The material referred to follows:)

STATEMENT BY LEWIS L. STRAUSS, CHAIRMAN, UNITED STATES ATOMIC ENERGY COMMISSION, MAY 7, 1957

The reports issued by the technical staff of the European Atomic Energy Community (Euratom) proposing a target of 15-million kilowatts of installed nuclear electrical capacity in the 6 Euratom nations by the end of 1967 is an encouraging development which marks another step forward in international cooperation to promote the peaceful uses of atomic energy.

The report points out that attainment of the goal fixed for 1967 is essential not only to Europe's economic well-being but also to its political security.

As was stated by the Department of State and the Atomic Energy Commission in February, at the time of the visit to the United States of "Three Wise Man" of Euratom, it is this country's purpose to help the community of six European countries in attaining their objectives, including both technical and material assistance.

I was pleased to note that the Euratom report describes the partnership of United States industry and Government, in developing the peaceful applications of atomic energy, as having provided this country with "the most complete nuclear foundation in the world."

As stated in the report, both the United States and the Euratom nations will benefit, in terms of more expeditious and sounder development of nuclear power technology, as result of the cooperative experience to be gained from the designing, building and fueling of Euratom's nuclear powerplants.

LETTER OF SUBMITTAL

of Messrs. Armand, Etzel and Giordani to the Ministers of Foreign Affairs of the six Euratom countries

May 4th, 1957

Your Excellency,

In accordance with the terms of reference laid down for us by yourself and your colleagues, we have the honour to attach our Report on the amounts of nuclear energy which can be produced in the near future in the six Euratom countries, and the means to be employed for this purpose.

In order to draw up our Report, we first of all consulted the government and industrial circles responsible for nuclear energy in our countries. We held a series of discussions in Paris, Brussels and Bonn with the authorities and with leading figures from the French, Italian, Belgian, Netherlands and German industries. In view of the shortness of the time at our disposal, the Italian representatives were good enough to come specially to Paris, and the Netherlands representatives to Brussels. In Brussels we had the further advantage of being able to discuss our problems with Mr. Spaak and his colleagues of the Intergovernmental Conference on the Common Market and Euratom.

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We were enabled in this way to obtain a general picture of the outlook with regard to energy requirements and resources, and of the nuclear programmes envisaged in each of the six countries. At the invitation of the American, British and Canadian Governments, we then visited their countries in order to study on the spot, with the assistance of qualified experts, the results of their work in the nuclear field and the conclusions to be drawn from it. These tours were exceedingly valuable from the fact-finding point of view.

In the United States, we were received by President Eisenhower. We had talks with the Secretary of State, Mr. John Foster Dulles, with the President of the Atomic Energy Commission, Mr. Lewis Strauss, and with his colleagues and assistants. We inspected an atomic power station now in process of completion at Shippingport, and also visited the National Laboratory at Oak Ridge, one of the main American nuclear research centres. In New York, at a meeting arranged by the Atomic Industrial Forum, we met the heads of the principal industrial firms working on the peaceful uses of nuclear energy.

In Canada, we talked with the Minister of Economic Affairs, Mr. Howe, and with the president of Atomic Energy of Canada Ltd., Mr. Bennett. We were also taken on a particularly instructive tour of the Canadian Atomic Research Centre at Chalk River.

In Britain, we met Lord Salisbury, Lord President of the Council, Lord Mills, Minister of Power, Sir Edwin Plowden, Chairman of the Atomic Energy Authority, and his colleagues and staff, and Lord Citrine, Chairman of the Central Electricity Authority, and his colleagues. We were given valuable information when we were shown round Calder Hall. We also had various profitable discussions with representatives of the industrial groups which have been set up in Britain to build atomic power stations.

We take this opportunity to thank the American, British and Canadian Governments and all those who helped us to derive such benefit from our inquiries.

The American Atomic Energy Commission and the British Atomic Energy Authority in addition most kindly put at our disposal experts whom we were able to consult after we returned, in order to line up our technical information on the American and British reactors in our Report and its annexes.

Our special thanks are due on the American side to Mr. Richard Cook, Deputy General Manager of the Atomic Energy Commission, Mr. Paul Fine, Director of the Operations Analysis Division, Mr. Louis Roddis, Deputy Director of the Reactor Development Division, and Mr. Andrew Van der Weyden, Deputy Director of the Division of International Affairs; and on the British side to Dr. Hill, Deputy Director of Technical Policy at the Atomic Energy Authority, Dr. Brown, Deputy Chief Engineer of Civil Reactors, and Mr. Johnson, Overseas Manager in the Technical Policy Branch. We are particularly grateful to them for their invaluable assistance.

We are, of course, entirely at your disposal as regards answering any questions you may desire to ask us after reading the Report and annexes. We would conclude by thanking your Excellency for the honour which you and your colleagues did us in entrusting us with a mission which was of such vital importance for the future of our countries in view of their very serious energy position and the potentialities opened up by nuclear energy.

We have the honour to remain, Your Excellency's most obedient servants,

ARMAND ETZEL GIORDANI

REPORT

A Target for Euratom

PREFACE

On November 16, 1956, the Ministers of Foreign Affairs of Belgium, France, the German Federal Republic, Italy, Luxembourg and the Netherlands instructed us to report 'on the amount of atomic energy which can be produced in the near future in the six countries, and the means to be employed for this purpose'.

On March 25, 1957, the Treaty instituting the European Atomic Energy Community (Euratom) was signed by the same Ministers in Rome and is now being submitted to the parliaments of our six countries. In the hope that this Community can begin to function in the very near future, we have entitled our report: A Target for Euratom.

While endeavouring to define this objective, we have been aware of the unique chance which the advent of nuclear energy offers our countries. Only ten years ago, Europe seemed to be condemned to have less abundant and more expensive energy than the United States; nobody would have imagined that this opportunity would emerge. Today, it can be said that if our countries, guided and stimulated by Euratom, make the necessary effort they will in future command—as the New World does now—abundant and cheap energy supplies, enabling them to enter boldly into the atomic era.

ESTABLISHMENT OF A TARGET

Europe's Energy Problem.

In the 19th century coal, produced cheaply and abundantly, multiplying a hundredfold the effectiveness of human effort, turned Europe into the 'workshop of the world'. In the last five years of postwar expansion, Europe has suddenly discovered that this favourable situation has entirely changed and that a new fact conditions all its prospects: the shortage of energy threatens to become a major brake on economic growth. This is the context in which the new prospects opened up by nuclear power must be assessed. It has become a practical possibility at a turning point in Europe's economic history (1).

In 1870, total world energy production amounted to 218 million tons of coal. Of this, the United Kingdom and our six countries together produced three-quarters. The story of the industrial development of the nineteenth century is bound up in these figures. Britain and the Continent not only powered their own unprecedented industrial progress; they were the great exporters of energy and its products to the world.

Unfortunately, if Europe's internal resources of energy were abundant by the standards of 1870, it is becoming clear that by the far higher ones of 1957 and still more of 1970, they are, and will be, increasingly inadequate. Though today our six

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(1) Annex I gives a detailed picture of the energy problems of the six countries together and individually.

countries alone mine more coal than the world did in 1870, they provide only 15% of world energy production. The rapid growth of their imports since the war shows that Europe's own supplies of all kinds of energy are falling far behind demand.

On the eve of the second world war, our six countries' energy imports were only five per cent of total requirements. During the postwar recovery they began to rise steeply. This was generally assumed to be temporary, while European coal production got back on its feet. And, indeed, in 1950 something like the pre-war equilibrium seemed to be within reach. But now, after the growth of the last seven years, it is clear that the demand in industry and transport, in the home and in agriculture is rapidly outrunning internal supply. Europe has lost its independence in energy.

The greatest possible effort to increase the output of energy from conventional sources must be undertaken in our six countries. But, however great this effort, it cannot keep pace with our needs. The conditions in which coal is mined, much less favourable to mechanization than in the United States, slow up the possible rate of growth. As more coal is sought, the veins to be exploited become deeper and more difficult to work, setting a limit to the further expansion of output. The same applies to hydro-electric power, the resources of which have been already largely developed. As for oil and natural gas, the prospects in our countries are good, but not by any means on a scale to bridge the gap between needs and supplies.

Europe's energy imports would rise to intolerable heights without nuclear power. Today already the six countries import nearly a quarter of their energy supplies, the equivalent of 100 million tons of coal, most of which is oil from the Middle East. The Suez Crisis has shown how precarious these supplies are.

For the future, we have assumed the greatest possible development of conventional power sources, and have based our estimate of energy requirements on a moderate but steady rate of economic expansion which is considerably slower than that since the war. Every effort has to be made to increase domestic production, but it must be realized that even on this assumption fuel imports into our countries would double in ten years and treble in twenty. They would reach 200 million tons (33% of total requirements) in 1967 and might reach 300 million tons (40%) ten years later. (See Fig. A p. 21.)

These enormous figures in fact call in question the whole future of Europe's economic growth, and even of its political security in the world. First, they imply an annual bill for energy imports rising (in round figures, at constant prices) from $ 2 billion now to $ 4 billion by 1967 and $ 6 billion by about 1975. Even taking into account the part of this bill met in national currencies, especially through the contribution of our merchant marine, the need for foreign exchange would put a most severe strain upon the balance of payments of our countries. The need to earn this additional foreign currency would also involve very important investments in export industries. And the increased pressure to sell on the world market would tend to push the terms of trade against Europe, a point of vital importance to the world's greatest trading area.

A second, still graver threat is the evidence, provided by recent political events and the ensuing oil shortage, that even the availability of imported energy is uncertain. Oil already provides over a fifth of our countries' energy supplies. It is cheaper per calorie than imported coal, and it is more convenient to handle and use. It is therefore likely that most of the increase in the demand which must be met by imports will take the form of oil.

We cannot expect to obtain this oil from the Western Hemisphere because demand there is rising faster than production. The only region of the world capable of supplying these quantities is the Middle East, where a very high proportion of world oil reserves is located. The oil discoveries in the Sahara are promising, but it can hardly be expected to provide more than a fifth of our energy imports by the mid-sixties. Thus without nuclear power, Europe's dependence on the Middle East is bound to increase. The Suez Crisis has given us a warning of what this could mean. As the quantity of oil imported from the Middle East increases, there will be a corresponding increase in the political temptation to interfere with the flow of oil from that region. A future stoppage could be an economic calamity for Europe. Excessive dependence of our highly industrialized countries on an unstable region might even lead to serious political trouble throughout the world. It is essential that oil should be a commodity and not a political weapon.

The European economy must be protected against an interruption of oil supplies, by finding alternative sources of energy to limit the further rise in oil imports. Only nuclear power, providing Europe with a new source of energy, can achieve this.

Scope for Nuclear Power.

Though it may be used to propel ships and to heat urban areas, the real contribution of nuclear energy in the next twenty years will be to produce base-load electricity in big power stations (1).

Electricity consumption is growing rapidly, doubling every ten or twelve years. To cover this new demand, the domestic

(1) Base-load electricity is power produced round the clock, as distinct from 'peak-load' power produced for only a few hours each day.

sources of energy specially adapted for power production (water, lignite, low-grade coal and natural gas) must be developed to the utmost. Even so, they cannot together meet more than one-third of the increase of electricity needs in the next twenty years. Two-thirds of the additional output must come from power stations fired with imported oil or coal, unless nuclear stations are built in their stead. The increase in production of saleable coal will be absorbed by other uses, especially for coke-ovens. The capacity of such power stations is estimated to rise by 22.5 million kW, from 38 million kW at the end of 1960 to 60.5 million kW by the end of 1967, apart from replacements amounting to more than 5 million kW in this period (see Fig. E Annex III p. 83). This is the field into which nuclear power can be fitted.

Every year that is lost in constructing nuclear power stations means that conventional stations, requiring increased oil or coal imports—and which continue to consume oil or coal throughout their lifetime of twenty or thirty years—will be built instead. In view of this situation, Europe must within the limits set by the pattern of electricity production, construct nuclear stations as rapidly as possible.

Nuclear plants take up to four years to build. Although some already under construction (such as the French power plant, E.D.F. 1), or shortly to be ordered, should come into operation in 1961 and 1962, nuclear power cannot be expected to provide a big contribution before 1963, since orders cannot be placed for substantial construction of plants before the end of 1958. Further, industry will need time to build up capacity before it can provide all the nuclear plant that could be used. Industrial firms will have to adapt their staffs and their production facilities to a new technology on a big scale. This means that we must expect a progressive build up in the rate of construction of nuclear power

stations. This delay will enable us to reach decisions on the basis of two or more years experience from the big nuclear power stations now under construction in the United States and the United Kingdom.

In view of these considerations, we estimate at some 15 million kW the nuclear power capacity that can be accommodated in the electricity system of the six countries during the next ten years. If this can be done, it will stabilize imports at the level they would otherwise reach in 1963 of around 165 million tons of coal equivalent a year (1).

This is an ambitious target. It will call for a great, continuous effort, since our industries, with the exception of the French, have had practically no experience in the nuclear field. Moreover, far from conflicting with an all-out effort to increase the output of conventional forms of energy, it is only by close collaboration between all methods of producing electricity that this target can be attained and the level of imports stabilized.

Great Britain has already faced a similar issue, and has come to a similar conclusion. She has in fact reacted very quickly to an energy problem that is less threatening than our own. Britain to-day imports only 12% of her total energy requirements, while we import 23%; in ten years' time these imports, if not checked by nuclear power, would rise to 22% in Great Britain, against 33% in our countries. Her programme of 6 million kilowatts by 1965 is expected to stabilize fuel imports from 1960 onward. The 15 million kilowatts which we are taking as our 1967 target can achieve the same result for us in 1963.

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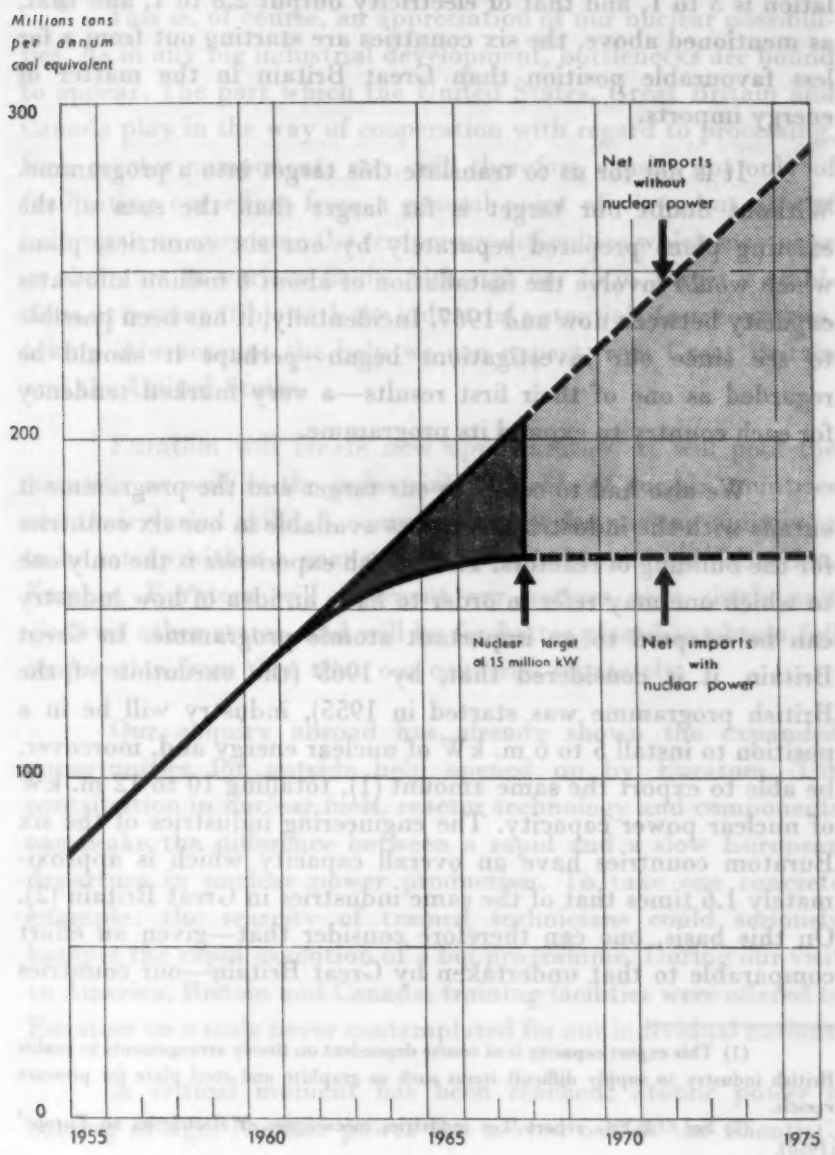
(1) Since oil has a higher calorific value than coal, it is necessary to convert oil tonnages into their 'coal equivalent' to obtain comparable or total figures for energy imports.

FIGURE A

Energy imports of six countries



This target is two and a half times the British programme, which seems reasonable when we consider that the ratio of population is 3 to 1, and that of electricity output 2.8 to 1, and that, as mentioned above, the six countries are starting out from a far less favourable position than Great Britain in the matter of energy imports.

It is not for us to translate this target into a programme. Without doubt our target is far larger than the sum of the existing plans prepared separately by our six countries, plans which would involve the installation of about 6 million kilowatts capacity between now and 1967. Incidentally, it has been possible to see since our investigations began—perhaps it should be regarded as one of their first results—a very marked tendency for each country to expand its programme.

We also had to compare our target and the programme it entails with the industrial resources available in our six countries for the building of reactors. The British experience is the only one to which one may refer in order to have an idea of how industry can be adapted to an important atomic programme. In Great Britain, it is considered that, by 1965 (the execution of the British programme was started in 1955), industry will be in a position to install 5 to 6 m. kW of nuclear energy and, moreover, be able to export the same amount (1), totalling 10 to 12 m. kW of nuclear power capacity. The engineering industries of the six Euratom countries have an overall capacity which is approximately 1.6 times that of the same industries in Great Britain (2). On this basis, one can therefore consider that—given an effort comparable to that undertaken by Great Britain—our countries

(1) This export capacity is of course dependent on timely arrangements to enable British industry to supply difficult items such as graphite and steel plate for pressure vessels.

(2) See O.E.E.C. report 'Les industries mécaniques et électriques en Europe' (1956).

should be able to build over 15 m. kW of nuclear energy in the course of ten years.

This is, of course, an appreciation of our nuclear possibilities. As in any big industrial development, bottlenecks are bound to appear. The part which the United States, Great Britain and Canada play in the way of cooperation with regard to processing, fuel, reactor components etc., will therefore consist not only of facilitating our effort from a general point of view, but also of helping us to overcome the temporary difficulties which may arise at the start in various fields. Although our 15 m. target is ambitious, it is compatible with the industrial potential of our countries, taking into account the help we can expect from Great Britain and the United States.

Euratom will create new opportunities. It will pool the scientific as well as the industrial resources of our six countries and their varied skills. A common market for nuclear equipment to be set up within a year will promote industrial specialization. Further, Euratom will represent our nations as a single unit vis-à-vis other states, and will be far better placed to obtain full cooperation from then than our countries separately.

Our enquiry abroad has already shown the expanded opportunities for outside help opened up by Euratom. The contribution in nuclear fuels, reactor technology and components can make the difference between a rapid and a slow European departure in nuclear power production. To take one concrete example: the scarcity of trained technicians could seriously hamper the rapid execution of a big programme. During our visit to America, Britain and Canada, training facilities were offered to Euratom on a scale never contemplated for our individual nations.

A critical moment has been reached: atomic power is coming of age. Nuclear power has moved out of the scientist's

laboratory onto the engineer's drawing board; it will now come quickly into commercial phase. This provides a great opportunity for our countries if we seize it and a grave danger if we do not. Scientific and technical knowledge can be borrowed; but industrial capacity one must create oneself. If our industries do not go ahead on a big scale now, at a time when others are poised to do so, they will soon be unable to face competition from the full-grown industries which have seen and seized their chances in time. Later development would only be possible behind protective walls with all the drawbacks they involve. In view of the growing importance of atomic techniques for industry, Europe, as the world's greatest exporter of engineering goods, cannot afford to miss the chance to move off to a rapid start.

So long as we act with drive and determination, the possibilities created by Euratom give us every hope of meeting the challenge of the atomic era, and, in so doing, of resolving our energy problem.

CONDITIONS OF ACHIEVEMENT

The scientists of our countries made fundamental contributions to the discoveries on which nuclear power prospects are based. But, as a result of the war and their divisions, they have taken little part during the last fifteen years in the massive and costly build-up of the foundations of nuclear industry. France has already begun to apply nuclear power on an industrial scale, and Germany, Italy, Belgium and the Netherlands are actively engaged in power projects and reactor development. But these efforts fall far short of what Britain, not to speak of the United States, has done to lay the basis for the commercial application of nuclear power. If our industries had, today, to start entirely on their own, an unduly slow and costly growth would be unavoidable. The American interest in the world-wide extension of atomic energy for peaceful purposes to which President Eisenhower's 'atoms for peace' programme testifies, has relieved our countries of some of the penalties of their handicap.

Cooperation with the United States, the United Kingdom and Canada.

The United States government showed a keen interest in the prospects of a big Euratom programme for the production of nuclear energy. Their well-known support for European unity and their interest in Europe's economic strength and stability explain this welcoming attitude. Europe can help America in the future as America is prepared to help us now. The average cost of electricity in America is about two-thirds of what it is in Europe, so atomic power will compete in Europe long before it can do so in the United States. An impressive amount of research and

development done both through the Atomic Energy Commission and by private industry have provided America with the most complete nuclear foundation in the world. But the large-scale application of this immense potential appears to be at least five to ten years off. Europe, on the contrary, needs atomic energy right now. No amount of research can be a substitute for the practical knowledge to be gained by the large-scale industrial application of atomic power. Europe could make this experience available to the United States. Our talks in Washington convinced us that, on the healthy basis of a two-way traffic, a close partnership as equals can be built up between the United States and Euratom and their respective industries.

For peaceful purposes, our visit provided indications of how the partnership would work. The United States would make available the necessary fissile materials and the technical knowledge to set our industries going. Once Euratom is established, a task force composed of some of America's most able men would be at out disposal to continue studying with European experts the many technical problems posed by our programme. America would provide training facilities for our scientists and technicians. Joint projects, for instance to improve and adapt reactors, can be envisaged between American and European industries, as well as between the American and European Atomic Energy Commissions.

Britain has concentrated on a reactor type which is now fully in the commercial phase. The British authorities have declared their readiness to facilitate contacts between British firms and those in Europe interested in building this type of reactor. They are also willing to assist Euratom in the vital matter of training scientists and engineers, and in putting their experts at our disposal to study the technical aspects of our programme.

Canada is equally prepared to cooperate. It can do so in two important ways. To begin with, it is one of the world's major sources of natural uranium. It would be ready to provide natural uranium to supplement European resources, provided it receives notices several years in advance, and that any agreement with Euratom guarantees the use of the uranium exclusively for peaceful purposes.

Further, Canada has done important original work on a type of reactor which promises to be particularly well adapted to European requirements, combining as it does many of the advantages of the natural and slightly enriched uranium approaches followed so far by Britain and the United States respectively. This reactor is well into the development stage. We have every reason to believe that Euratom would find the Canadian authorities willing to cooperate on the construction of prototypes.

In consequence of the far-sighted view the United States, Britain and Canada have taken of their interests in cooperating with our nations in nuclear development, we have the assurance that a large nuclear programme would obtain not only the benefit of years of development in these countries, but also the material supplies and technical assistance indispensable to a quick start. This broad cooperation is being offered because Euratom gives prospects of joint action on a scale our countries individually cannot propose and has been made possible by the Euratom provisions for an effective system of control of fissile materials.

Agreements of association should therefore be concluded between these countries and Euratom immediately after its establishment. At the same time, close cooperation should be developed with neighbouring countries, particularly Switzerland, Austria and the Scandinavian States, through O.E.E.C. or in other ways.

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Strong cooperative ties with other countries—by which we obtain, now and later, the help of those who have explored nuclear possibilities more fully than we have, and in return offer our help in future to them and to other interested nations—must be the foundation of Europe's atomic progress. Far from undermining our independence, it is the only way we can gain our place as equals in the field. The road to dependence would be the opposite one, to confirm our backwardness by resorting to the illusion of self-sufficiency. Cooperation with others will not limit our opportunities, but create new ones, so that our industries can eventually acquire their own, distinct nuclear personality.

Reactor Construction.

Our inquiry has convinced us that, though there are at least a dozen prototype reactors in an advanced stage of design or under construction, only two types are ready for commercial use. One has been developed in the United States and the other in Britain and France (1).

The first is fueled with slightly enriched uranium (2), and is cooled by water under pressure, or by boiling water. This system was originally developed for submarines, and one unit has been functioning without interruption in the Nautilus for nearly two years. The experience gained on this project gives great confidence in the reliability of this type of reactor. Full scale commercial prototypes of both versions of these reactors are under construction, in several cases entirely by private firms.

The second type, developed furthest in Britain, is the gas-cooled reactor fueled with natural uranium. Its prototype at Calder Hall has been working successfully for the last six months.

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(1) Annex II describes reactors in greater detail.

(2) Uranium in which the content of the fissile isotope U-235 has been increased above the level of 0.71% found in nature.

Confidence in the performance of this reactor enabled Great Britain first to set up a nuclear programme in the beginning of 1955, and then, at the beginning of this year, to treble it. Several large stations are now under construction for the British electricity authorities. The first French reactors now functioning or being built are of the same type.

Attention should be given by European firms interested in building power reactors and by Euratom itself to the development of two other types, not yet in the commercial phase, but which appear specially appropriate for Europe: a version of the British gas-cooled reactor, operating on slightly enriched uranium, and the heavy-water reactor developed mostly in Canada. Joint projects might be launched by industry or Euratom to solve the design and development problems to be overcome before these reactors can become commercial.

To begin quickly we must either buy some reactors from the United States and the United Kingdom or build them under license. This will not involve accepting permanent industrial dependence. On the contrary, it will speed up our industries' nuclear education, and provide a basis of well tested experience to root and nourish their own original contribution. Even if the reactor itself has to be imported, a large proportion of each of the first nuclear power plants will be built by our own engineering industries, and the proportion of components that must be imported will quickly fall.

The industrial re-orientation required will undoubtedly raise difficult problems, but they may prove less intractable than is often thought. Intensive re-training of engineers and scientists will be needed, but both the United States and the United Kingdom are ready to help. Euratom must carry out training programmes with the facilities they offer, on top of those already existing in Europe, and those that it will itself create. Further,

the number of trained men required to design and build proven reactors is smaller that that needed to develop entirely new ones. A high proportion of the construction work in nuclear power plant differs little from the tasks which engineering firms are performing today. The industrial groups which have designed and are now constructing power reactors in the United Kingdom started with limited nuclear experience 18 months before their tenders were submitted to the U.K. Electricity Authorities.

Euratom and its objectives will be the stimulus, guiding and enabling better use to be made of our industries. The standardization of reactor components and procurement contracts should be encouraged. Also, a certain amount of general coordination will be essential because a programme involving millions of kilowatts under construction at any one time, and requiring a wide range of new materials and components, might easily be thrown out of gear by serious shortages and costly delays. Industry, for example, should be informed of the need for big high-pressure shells for reactors at least four years ahead of delivery in view of the likelihood that its capacity for their manufacture would have to be expanded.

Fuel Requirements.

Fuel requirements will depend very much on the types of reactor chosen by the electricity suppliers. However, it is now already clear that the fuel required to reach the target envisaged for Euratom will be obtained without difficulty, since its requirements are a small part of world production of nuclear fuels during the period under review (1). The uranium production in our countries, although small at present, is expected to rise as prospecting extends the field of known reserves. Further we have

(1) Fuel needs are estimated in Annex III.

assurance that, in Canada, natural uranium output can increase considerably if the demand is firm.

We also attach particular importance to the statement made by the U.S. authorities that they do not consider that nuclear fuels will be a limiting factor. This opinion has been inserted in the Communiqué (1) which the Secretary of State and the Chairman of the Atomic Energy Commission issued jointly with us at the end of our discussions in Washington. As this statement comes from the country which is the world's biggest producer of enriched uranium, and one of the biggest of natural uranium, we can be sure that the availability of nuclear fuel will not limit the realization of our target.

Euratom's action on fuel supplies could be of decisive importance for our industries. The total expenditure on nuclear fuels in the ten-year period required to reach the target of 15 million kW would amount to about $ 2000 million (2). According to the Euratom Treaty, special fissile materials will be owned by the Community. Therefore Euratom will retain title of the enriched uranium it will put at the disposal of the users and may well finance both enriched and natural uranium centrally as is done domestically in the United States and the United Kingdom.

Fuel problems do not end with the supply of fissile material. Both natural and enriched uranium have to be fabricated into fuel elements (3) before use. And after use they must generally be processed in chemical plants to recover the valuable fissile products still left in the spent fuel.

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(1) See Annex V.

(2) See Annex III, para. 8.

(3) For the present types of reactor, the nuclear fuel must be formed into cylindrical or plate-type elements enclosed in suitable materials (magnesium, zirconium, stainless steel, beryllium, etc.).

Undoubtedly, for the needs of the first nuclear power plants, fuel elements can be imported from abroad, and the spent fuel returned to be processed. Both America and Britain are willing to do this, and have indicated the prices they will charge. But it would be inconsistent with our need to reduce our dependence on costly energy imports to continue to rely on other countries for these services. Both operations require plants serving many reactors to be economic. If each of our countries were to act as separate unit, it would take many years before it would be possible to build these plants on an economic basis. The establishment of the European Atomic Energy Community will allow us to build both fuel fabrication and chemical processing plants as soon as a large number of reactors are being built.

Euratom could also construct a plant to produce the enriched uranium needed (1). Till recently, this seemed the only way to obtain it. But there is now no doubt that our countries can obtain enriched uranium from the United States in the necessary quantities, and at the low published prices. These low prices are a consequence of the vast size of American plants, the extremely low power costs in the areas where they are located, low finance costs, and a very highly developed design and technology. Enriched uranium produced in Europe would, therefore, probably cost two to three times as much.

The building of a Euratom diffusion plant has been advocated to avoid basing nuclear energy production on a material that must otherwise be obtained from another country. If important quantities of enriched uranium had to be permanently imported, this argument would carry weight. But several years would elapse before Euratom's diffusion plant could operate. And the future of enriched uranium requirements is very uncertain.

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(1) Known as 'gaseous diffusion' or 'isotope separation' plants.

Even apart from the prospect of breeder reactors (1), plutonium will be produced in the fuel of Europe's first reactors. It is very probable that we will find an economic way to use this plutonium, and so reduce our needs of enriched uranium. Other improvements in reactors may have the same effect. In the end, these developments might even enable power reactors of all types to be based exclusively on natural uranium with fuel recycling.

Therefore, while it is essential for our countries to study with the greatest care the economic and technical aspects of uranium enrichment, it should be noted that the decision to build a diffusion plant on a commercial scale, which means a heavy investment of capital and would consume large quantities of energy, does not have to be taken before a programme for the production of nuclear electricity is launched.

Costs of Nuclear Electricity.

At what cost will electricity be produced by the nuclear reactors commissioned before the end of 1967? And how will this cost compare with the cost of energy obtained from the new coal- and oil-fired stations which would have to be built if nuclear plants are not erected instead? Certain general points must be mentioned.

In the first place: only very limited experience is available in regard to full-scale power reactors; nuclear electricity costs are therefore always estimates, never proven facts. After extensive checking and discussion, inter alia, with the experts whom the American Atomic Energy Commission and the U.K. Atomic Energy Authority so kindly put at our disposal, we consider those which follow to be reliable.

In the second place: the cost of electricity produced by a given reactor will not remain continuously on one level, but will

(1) Reactors producing more fissile material than they consume.

follow a descending curve as the operating technique improves in the course of time. Cost estimates must, therefore, be based on the *average* estimated cost of the electricity produced by a nuclear reactor in the course of its life. Operating costs will be high at the outset of the operation, but will decline in the following years—to a lower level as operating conditions are stabilized. Even in the case of the first reactors, power costs will continue to fall gradually as the techniques of using fuel improve. Nuclear fuel costs are low—less than half the fuel costs in conventional plants—and the saving will apply only to about one quarter of total nuclear costs, though they could be significant. Unlike nuclear stations, the fuel costs of conventional plants must be expected to rise slowly but steadily, relative to the general level of prices.

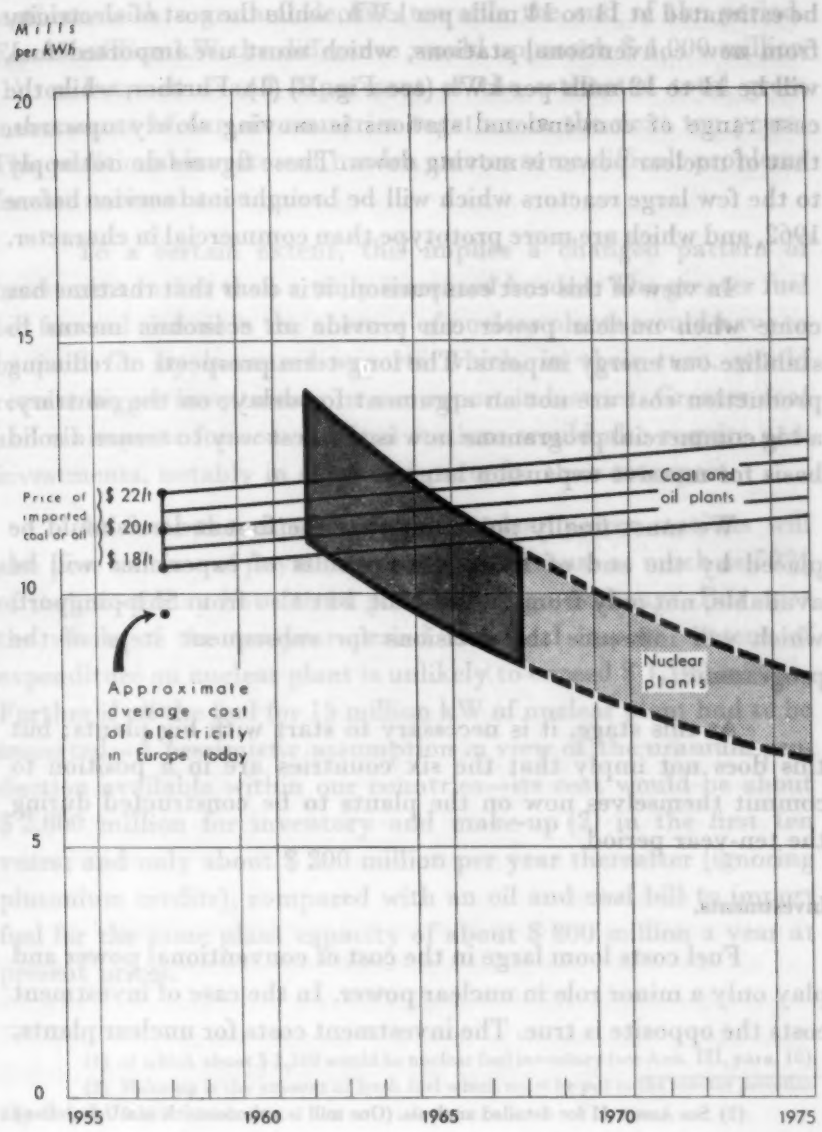
In the third place: comparison with the electricity costs of conventional plant must be based on new conventional plant burning imported fuel, because we have seen that nuclear power plants will only replace those which would have to consume imported fuel. It is impossible to evaluate in terms of costs the increasing risk of a stoppage in the flow of oil from the Middle East. But electricity producers would be ill-advised not to take this risk into account.

In the fourth place: as it is unlikely that advanced reactors promising far lower power costs, will come into commercial use before the end of our ten-year period, we do not propose to discuss them. But all the best authorities (1) agree that the cost of nuclear energy, even for current reactor types, will decline in the next ten to fifteen years.

(1) Cf. two of the most important recent studies — lecture on 'The Future for Nuclear Power', delivered by Sir Christopher Hinton, member of the United Kingdom Atomic Energy Authority (March 15, 1957); and 'The Latest Prospects for Economic Nuclear Power', prepared by W. Kenneth Davis, Director, and Louis H. Roddis, Deputy Director, Division of Reactor Development, of the United States Atomic Energy Commission (March 14, 1957).

FIGURE B

Future electricity costs · Trends for new plants



Taking these general considerations into account, our conclusion is that the range of costs of electricity produced by nuclear reactors of both the American and the British type, may be estimated at 11 to 14 mills per kWh, while the cost of electricity from new conventional stations, which must use imported fuel, will be 11 to 12 mills per kWh (see Fig. B) (1). Further, while the cost range of conventional stations is moving slowly upwards, that of nuclear power is moving down. These figures do not apply to the few large reactors which will be brought into service before 1962, and which are more prototype than commercial in character.

In view of this cost comparison, it is clear that the time has come when nuclear power can provide an economic means to stabilize our energy imports. The long-term prospects of reducing production cost are not an argument for delay; on the contrary, a big commercial programme now is the best way to secure a solid basis for massive expansion later.

We must finally point out that the first orders should be placed by the end of 1958, when results of experience will be available, not only from Calder Hall, but also from Shippingport, which will influence the decisions for subsequent steps of the programme.

At this stage, it is necessary to start with big plants; but this does not imply that the six countries are in a position to commit themselves now on the plants to be constructed during the ten-year period.

Investments.

Fuel costs loom large in the cost of conventional power and play only a minor role in nuclear power. In the case of investment costs the opposite is true. The investment costs for nuclear plants,

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(1) See Annex II for detailed analysis. (One mill is a thousandth of a U.S. dollar.)

including fuel inventory, must be estimated for stations to be brought into service in the next ten years to average somewhat more than two and a half times the cost of conventional steam stations, with a gradual decline towards the end of the period. For 15 million kW the difference would approach $ 4,000 million (1), or between 1 and 2 per cent of the estimated total gross investments of our six countries together in the next ten years. This additional investment burden creates some difficult problems for our national economies.

To a certain extent, this implies a changed pattern of investment rather than a truly increased burden. The greater fuel bill for coal and oil in the absence of nuclear plants would have to be paid for by increased exports which, in their turn, would require bigger investments in our export industries. Greater coal and oil imports for conventional stations would also require new investments, notably in ships and ports for their transport.

At first, the expenditure on nuclear power stations will also pose balance of payments problems, because as much as 50% of their cost may have to be paid in foreign exchange. But over the whole of the ten-year period the total import content of expenditure on nuclear plant is unlikely to exceed $ 1,100 million. Further if *all* the fuel for 15 million kW of nuclear plant had to be imported—a pessimistic assumption in view of the uranium production available within our countries—its cost would be about $ 2,000 million for inventory and make-up (2) in the first ten years; and only about $ 200 million per year thereafter (ignoring plutonium credits), compared with an oil and coal bill to import fuel for the same plant capacity of about $ 800 million a year at present prices.

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(1) of which about $ 1,100 would be nuclear fuel inventory (see Ann. III, para. 10).

(2) Make-up is the amount of fresh fuel which must be put in the reactor periodically as spent fuel is withdrawn.

Therefore, though the balance of payments situation of our countries would not benefit immediately by the rapid introduction of nuclear power, the moderate increase in imports during the first years will be rapidly offset by big foreign currency savings subsequently. For these reasons, the expenditure of larger sums on building nuclear rather than conventional power stations is in the public interest.

However, this does not help our electricity suppliers to solve their investment problem; even now the rapid growth of electricity demand is putting a severe strain on the investment resources of our electricity industries. There is a gap between the public interest—which calls for the achievement of our target—and that of the individual electricity supplier, who faces commercial risks by investing heavily in nuclear rather than conventional stations. Yet a prompt commitment on the first plants is essential, both in order to get a quick start and to obtain the greatest experience of reactor construction in the shortest time.

As conditions differ widely in each of our countries, we are not in a position to suggest solutions. However, the Euratom Commission, jointly with the governments and industries concerned, should make a thorough study of this problem, for if it is not solved, it will make our target and the consequent stabilization of energy imports totally illusory. They should also consider incentives, such as increased depreciation allowances for nuclear stations, operative in the first and most difficult years, and other financial measures.

We also attach the greatest importance to a common legislative approach on insurance for nuclear plant, covering the third-party liability of companies engaged in constructing and operating reactors, as well as the liability of manufacturers outside our countries with respect to the performance of their products.

In the United States, the absence of adequate Federal legislation may have seriously retarded the construction of reactors by private industry. Legislation to cover this gap is now being discussed by the U.S. Congress. All experts, both in the U.S. and the U.K., agree that the chance of accidents is exceedingly small. Nevertheless, additional protection against liability in excess of the available insurance coverage is necessary. If an accident should happen on the border of one of our countries, the damage might extend across frontiers. Big nuclear power stations might be ordered jointly by electricity companies in several of our countries. The common market for nuclear products, to be set up within a year of the establishment of Euratom, will also facilitate the placing of orders across national borders. For all these reasons, a common legislative approach to these problems is necessary.

* * *

Europe's economic growth is in danger of being seriously hampered by the lack of energy to nourish it. Being short of domestic energy supplies, our countries must turn increasingly to imports to meet their needs. But imports are costly; and in their most important form of Middle East oil, the supply itself is uncertain. To rely unduly upon them would be increasingly burdensome and hazardous. The advent of nuclear power now gives us a chance to stem their rising tide by building nuclear instead of new conventional power stations using imported oil or coal.

Comparison between the price of nuclear and conventional energy has lead us to conclude that a big effort now would be justified. Industrially, we believe this would be feasible, if our six countries act together, with the help of America, Britain and Canada, who are ahead of us in the application of nuclear techniques, and ready to cooperate fully with us.

The pooling of our financial resources, industrial capacities and varied skills through Euratom will enable our countries to muster the great effort required. Euratom will be able to guide and stimulate action, in particular by providing means to bridge the gap in the initial period between the commercial risk, which firms face in building nuclear plants, and the public need for the most rapid progress.

The establishment of the European Atomic Energy Authority, on which our nations are called to decide, offers the means to achieve the target we envisage: the construction of 15 million kW of nuclear plant by the end of 1967, in order to stabilize our imports early in the 1960's.

Chairman DURHAM. There was an earlier release on January, but this is well documented.

Senator ANDERSON. I only want to say, Mr. Secretary, that I appreciate the remarks of the Senator from Rhode Island. Nobody has been more determined than he that this get up here and be acted upon and be acted upon affirmatively as he pointed out here. He has tried every way he can. If there have been delays I rather gathered from the tone of some of the editorials that the blame was all ready to be put upon the Congress for not acting upon this. I merely want to point out that some little blame can be taken on individuals who get this to us on the 23d day of June and expect it to be rushed through at a time when Congress is very busy.

I have here the original letter and papers that the Joint Committee released. You have it there. On page 7 from a letter of Admiral Strauss, the third paragraph, "Ownership and responsibility for the approximate quantity of 21,000 kilograms of special nuclear material for which Euratom pays in cash to be transferred to the Community at a designated point or points of embarkation."

Can you tell me where that is in the agreement that they are going to pay for this 21,000 kilograms in cash?

Mr. DILLON. Senator, this can be found in various places. Article 3 of the agreement for cooperation states that the United States Commission will sell to the Community uranium enriched in the isotope U-235 for use in projects designated by the parties pursuant to the joint program up to a net amount of 30,000 kilograms of contained U-235 in uranium.

Then the detail regarding that sale is contained in the working paper which can be found on the last page of this document on page 52. The third paragraph states that enriched uranium transferred to Euratom above the amount of the agreed fuel inventory will be paid for by Euratom at the time of the transfer at United States domestic prices in effect at that time.

Senator ANDERSON. I am still looking for the words "in cash."

Mr. DILLON. The words "in cash" is not there. It says "will be paid for."

Senator ANDERSON. If they give a promissory note that is a payment?

Mr. DILLON. The understanding is that they will pay in cash.

Senator ANDERSON. Where is the understanding?

Mr. DILLON. The understanding was written where they said "will pay for," which I just read.

Senator ANDERSON. That could be a charge account. The rest of it is a charge account.

Mr. DILLON. I can only refer to the people who negotiate the agreement on both sides and they say it is clear it is the intention of Euratom to pay for that in cash.

Senator ANDERSON. Couldn't that be on the installment plan?

Mr. DILLON. It is not intended that it will be paid for on the installment plan.

Senator ANDERSON. How do you know? There is not a word that says anything about it. That is what I am trying to get to. I think this is a business document. It is going to run, I think, $700 million, and I believe that you have to ask a question like that in private business.

Mr. DILLON. I quite agree that is a good question.

Senator ANDERSON. You have some provisions in working papers. Who signed the working papers to give the legal effect and force?

Mr. FARLEY. The working papers, Senator, were exchanged between the members of the negotiating teams of the two sides.

Senator ANDERSON. Do I understand that the exchange of papers makes them official?

Mr. FARLEY. No, sir. But the agreement which we do sign simply gives the Atomic Energy Commission authority to make material available on a deferred basis, and does not make any more commitment than is contained in the working paper. So the United States Government's interest is protected.

Senator ANDERSON. Wouldn't the international agreement be a good place to protect the interest of the United States Government?

Mr. FARLEY. I believe, Senator, that the agreement does protect the interest of the United States Government since it makes no commitment.

Senator ANDERSON. Has the agreement been changed before the testimony was given to the Joint Committee that at one time you planned to transfer title to the whole 30,000 kilograms without payment? Has it been changed? The agreement does not break down the 30,000, does it? It is just a working paper.

Mr. DILLON. It is just in the working paper.

Senator ANDERSON. Are you bound by the agreement or by the working papers?

Mr. DILLON. You are bound by the agreement but the agreement merely states that the Atomic Energy Commission is charged with selling this material and that they may sell some of it on the deferred payment basis. It is their intention to sell the inventory amount on a deferred payment basis and the rest not.

Senator ANDERSON. On a what kind of payment basis?

Mr. DILLON. A deferred payment. Charge account, as you say.

Senator ANDERSON. Is it planned to sell it so we transfer title immediately and don't begin to collect any money for 10 years?

Mr. DILLON. Except for the interest on the value of it which we collect at 4 percent from the beginning.

Senator ANDERSON. We give them title on transfer?

Mr. DILLON. That is right.

Senator ANDERSON. Ten years later they start to pay us for it?

Mr. DILLON. They start to pay us for it. They pay interest in the meantime.

Senator ANDERSON. Would it wear out in the intervening years?

Mr. DILLON. I would refer that question to the Atomic Energy Commission.

Senator ANDERSON. Do they guarantee any reactor fuel to last more than 10 years? This is one of the financial questions.

Mr. DILLON. I think that question is a technical question that I can't answer.

Senator ANDERSON. It has been suggested that we get a first lien on it. How do you get a first lien? How do you recover by foreclosing a mortgage against six sovereign nations, and who do you send over as the marshal to physically recover and bring back?

Mr. DILLON. Obviously, Senator, when you are dealing with sovereign nations you cannot send a marshal over to recover and you have to depend on their good faith.

Senator ANDERSON. I wouldn't ask you where you record the mortgage. I am sure you would agree with me, Mr. Secretary, that in a business transaction you generally know what your security is and how you can enforce your lien if you have one.

Mr. DILLON. That is correct.

Senator ANDERSON. I read through the international agreement on page 13. I regret that I don't have a page in this larger document. That agreement doesn't say much, does it? That is the only thing that is really signed, is it not?

Mr. DILLON. That is the only thing, as I understand, could be legally signed. There is also a memorandum of understanding which has been signed. The agreement itself cannot be signed until the Congress acts on the international agreement.

Senator ANDERSON. But the memorandum of agreement has no legal standing, has it?

Mr. DILLON. It has no legal standing at the moment, no.

Representative HOLIFIELD. Will the Senator yield?

Senator ANDERSON. Yes. I am just trying to find out where we stand from a business standpoint.

Representative HOLIFIELD. On this very point, I would like to know if the 8 appendixes and 12 working papers are terms and conditions and understandings and an integral part of the agreement. Are they supplementary thereto?

Mr. DILLON. I think the whole thing is one package, and they are all supplementary to the program which we are trying to carry forward.

Representative HOLIFIELD. But they do not have the legal force of the agreement?

Mr. DILLON. They don't have the legal force of the agreement, no.

Representative HOLIFIELD. Are the terms, conditions, and understandings fixed, or are they flexible? Can they be changed from time to time, or are they considered, as we have to consider them here before us today, as the factors of this agreement?

Mr. DILLON. The terms of what will be in the agreement for cooperation are fixed. They have been agreed to and that agreement is shown by the initials of both the United States and members of the Commission. That agreement will be signed if and when the Congress acts favorably on the 124th agreement. As soon as that is signed, it will be submitted to the Joint Committee and it will be a formal document.

Representative HOLIFIELD. My last question is, regardless of what the Congress feels about these appendixes and working papers understandings we cannot at this time express any difference of opinion and have that effective as part of the supplementary documents pertaining to the legal agreement?

Mr. DILLON. I would say that is not entirely the case. The international agreement and the agreement for cooperation, I think are fixed. There is latitude for administration under those agreements. Certainly any expression of opinion by this committee or the Congress would govern the attitude of the United States in carrying out these documents.

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Representative HOLIFIELD. If the Congress wishes to approve this under certain conditions, then what position do you find yourself in?

Mr. DILLON. If the conditions were such as to change the agreement for cooperation we would be in the position of having to go back to Euratom and ask them to accept a change in this document that they already negotiated, and whether they do so at this time is problematical.

Senator PASTORE. If the Senator will yield to me on that point, that being the case, that your working papers are considered to be an integral part of this international arrangement, you have also submitted to the committee an agreement for cooperation which has no legal standing until you perfect your law under section 124, then it being desirable that this being effected with all expedition, then why didn't you make it all one agreement and submit it under 124, both your agreement for cooperation and the international arrangement?

If we passed it by this session of Congress you would have had the whole thing. Whereas, you have to come back after you pass it under 124, under 123 in order to put through the agreement for cooperation. Do the attorneys agree with me on that?

Mr. DILLON. All I can say is that that was a legal problem and our attorneys felt they were following the statute and following this procedure. Maybe they could have adopted the procedure you suggest.

Senator PASTORE. Your international arrangement could have incorporated an agreement for cooperation. There is no question about that. It could have been all together and you could have spelled it out. You could have included your understandings under your working papers and your memorandum of understanding and you could have also put in all the terms and conditions that you have under your agreement for cooperation and come up here with one package.

That could have been done under 124.

Mr. DILLON. I think it probably could, Senator. But I think it is our understanding that that is in essence what we have done by asking for a waiver of the 30-day period by the Joint Committee and submitting at the same time as we submit the 124 agreement the full text of what will be the 123 agreement.

Senator ANDERSON. Actually, Mr. Secretary, with the statements you made and that you indicate the AEC is going to make about speed, you are in effect telling us, swallow it all at one time in one swallow. All these working papers have to be changed otherwise and it would delay us and we could not go ahead with it, and you have just given us one chunk to swallow when you could have just as well as Senator Pastore points out if you were going to give us 1 big dose of medicine put it all in 1 bottle.

I don't understand the reason for giving it to us this way and saying it has to be done at one time. It seems to me that the Joint Committee and the Congress, if so desired, could give some blessing to the idea and take time to go through the working papers and find out what they mean. For example, Mr. Secretary, in appendix (c), I started reading down through it—I am looking now on page 14—we get the first memorandum of understanding and it starts to deal with the European Community of Euratom and the United States and then it goes down five paragraphs and says, "for these reasons

the Commission of the European Atomic Energy Community and the United States have agreed"—not Euratom agreed.

I may say if people know that I am the sole owner of the corporation and the president and my son is the secretary and we come in and borrow money, you as a banker know what they require. They require a resolution of the Board of Directors authorizing me to do it. Have you any papers from the community authorizing the Commission to do this.

Mr. DILLON. The next paragraph on the top of the page says:

It is understood that the establishment and initiation of the joint program is subject to appropriate statutory steps, including authorization by the competent bodies of the Community and of the Government of the United States.

Senator ANDERSON. I am sorry, where was that again?

Mr. DILLON. At the top of page 15.

This has been approved by the Council of Ministers and all the competent bodies of Euratom.

Senator ANDERSON. Euratom has passed a proper resolution authorizing these people to do this.

Mr. DILLON. Yes, sir.

Senator ANDERSON. Then I go to page 16 in our document, which is item 7:

The Government of the United States shall make available to the community as needed enriched uranium for the nuclear power reactors to be included within the proposed program in sufficient quantity to meet inventory and operating requirements for a 20-year operating period.

How much would that be?

Mr. DILLON. I understand that is 30,000 kilograms.

Senator ANDERSON. Do we hope that the European community is only going to build these six reactors and stop there?

Mr. DILLON. No, sir. I think they will probably build other types of reactors, and make arrangements maybe with the United Kingdom to build their type of reactor. They may develop their own types.

Senator ANDERSON. Are we obligated in any way to go along with that program?

Mr. DILLON. Not at all.

Senator ANDERSON. Is that why at a later point in the agreement—it will take a little time to find this, at page 21, we have no obligation to any other program—

However, reactors under the joint program may be fueled with elements from other sources. In such cases the United States Commission will offer to perform chemical reprocessing services at its published charges with respect to any source or special nuclear material obtained from the United States. If adequate facilities are not available in Euratom countries when needed, the United States Commission will give sympathetic consideration to furnishing reprocessing services on material not furnished by the United States Government.

Does that mean if Russia supplied some material that we would reprocess it, or if Great Britain supplied some material that we would reprocess without charge.

Mr. DILLON. I think there would certainly be a charge for anything of that type. They do not have any reprocessing facilities at the moment available in Europe.

We hope and probably expect that they will develop their own reprocessing services.

Senator ANDERSON. This agreement provides for reprocessing in the United States. Who is going to pick up these hot elements and bring them here?

Mr. DILLON. I think that is a technical question that the Atomic Energy Commission representatives will be prepared to answer.

Senator ANDERSON. On page 20, guaranties, arrangement for supply of fuel element, and so forth, I skip a few words but I hope not to change the meaning—

> may be received from commercial sources but in the event of fuel elements such arrangements may not sufficiently cover the cost of reprocessing, transporting fuel elements, and so forth. Under such conditions the United States Commission will for the purpose of prorating the chemical processing and for transportation costs offer to guarantee an average irradiation level which in combination with the guaranties offered by the manufacturer would result in a computed fuel-cycle cost equal to the standard fuel-cycle cost.

Can you tell me under what section the Atomic Energy Commission is authorized to guarantee the life of these reactors?

Mr. DILLON. I understand that this is one of the items in the proposed bill that is now before you which would authorize this.

Senator ANDERSON. Then if we don't pass the proposed bill we have broken the agreement here and we throw it back in their lap again.

Mr. DILLON. The general agreement under 124 would not be affected, but the agreement under 123 would not go forward.

Senator ANDERSON. One of the difficulties in the sale of reactors here at the present time is that the British are unable to guarantee the life of their fuel elements by the British Atomic Energy Authority. The American manufacturer is in a position to meet that guaranty. This is the question now pending with the Belgian reactor for example and may be involved in the Italian. The American manufacturer can't do it now.

Is this to put the United States in the position of guaranteeing the life of these reactors?

Mr. DILLON. I think that is essentially correct for 10 years.

Senator ANDERSON. If the American manufacturer is not willing to do it, you feel that the United States Government should?

Mr. DILLON. That is correct.

Senator ANDERSON. There are a great many questions, Mr. Secretary, I am sure should be directed to the technical people from the Atomic Energy Commission.

Mr. DILLON. That is correct.

Senator ANDERSON. I only want to suggest to you again that there are a great many ifs in this program, and it does seem that the only alternative given the Congress, if we hope to get action this year, is to take a whole lot of things as someone else has negotiated, that somebody not being an agent of Congress in any way, and accept what has been done even though these other countries may have the right to go back to their people and find out what their people want before they sign them up.

I don't believe you have left that choice to the American Congress. You have only the choice of being responsible for throwing it all up in a tailspin at this session or swallowing everything that has been said.

Is there any way that we can change one line of any of the working papers without having it all go back to the proper renegotiation?

Chairman DURHAM. As soon as it was committed to the committee, Senator, the committee staff was ordered to go into the whole question.

Mr. DILLON. I think this is generally similar to the negotiation of any international agreement which has been carried out by the Executive and then submitted to the Congress for approval. The working papers, however indicate ways in which the agreement could be interpreted. I will ask Mr. Schaetzel, who took a leading part in formulating these working papers, to speak to that.

Mr. SCHAETZEL. Senator, I think we all regret, and the Europeans regret as well, that we tried to do in several months what we would have liked to have had a year to do.

Chairman DURHAM. You mean they regret it for themselves.

Mr. SCHAETZEL. No; I said they regret and we regret that we didn't have a year to formulate the program.

Chairman DURHAM. What would have been wrong in taking a year?

Mr. SCHAETZEL. The problem was that the Community did not come into being until the 1st of January. The first time the United States met with the officers of the Community was at the first meeting of the Euratom Commission on February 18 in Paris. The working group was set up at that time to consider the feasibility of such a program. That group had its first meeting in Luxembourg about March 20, and met there until just before Easter.

There was further consultation in Europe and here to consider the progress made up to that time. There was another meeting in Washington with Euratom representatives in the latter part of April, which went on to May. The working papers are essentially an attempt to find out whether such a program was feasible. On the basis of the working papers, the agreement for cooperation was drafted. I think all of us have reflected about the real intent and legal status of the working papers. We probably would state it slightly differently, but I think the consensus of the American officials——

Senator ANDERSON. How would you state it?

Mr. SCHAETZEL. The working papers are the background for the agreement for cooperation and the program, Senator, and, as we get into it and examine the types of questions which you raised, certainly, the working papers are subject to adjustment.

It is the legislative history behind the program, but it is not the kind of fixed understanding which can't be altered as we move forward with the program. The question you asked Secretary Dillon was whether, if you accept the agreement for cooperation and the section 124 agreement, you are buying this entire document exactly as it is, and I think the answer is "No," Senator.

Senator ANDERSON. We don't have to buy the entire document, in other words.

Mr. SCHAETZEL. No, sir.

Senator ANDERSON. In other words, we could accept the first agreement, which is as vague and general and meaningless as anything I have ever seen, and stop with that, if we felt like it.

Mr. DILLON. That could be done, but that would not have any effect.

Senator ANDERSON. That is what I am trying to get. I don't want somebody to come up afterward and say we have to take the whole thing. He says we don't have to.

Mr. DILLON. I think he is referring to the working papers which are attached hereto.

Senator ANDERSON. The appendixes, also.

Mr. SCHAETZEL. Sir, the three documents which the Congress would act upon to bring the program into being are the 124 agreement which, essentially as you say, identifies Euratom as a body with which the United States Government can do business. In the light of that, as Senator Pastore and others have said, this would enable us to bring the bilateral agreement for cooperation into being, which specifies the undertakings on both sides. The third piece is the act for cooperation with Euratom which you have before you.

The point I was speaking to are the various appendixes and working papers. These were illustrative documents designed to give you all the papers produced by this working party and which indicate how we got to where we are. I was merely speaking to the point that those documents, the annexes and working papers, are subject to changes as we move along with the program, if the Congress acts on the other three items.

Senator ANDERSON. The International Atomic Energy Agency treaty was before the Congress, and you may recall that there were some reservations by Senator Knowland which were adopted to it. What is the difference between that and this? Couldn't we adopt this with some reservations?

Mr. SCHAETZEL. Surely, sir. If this were done, this would require us to take the documents back to the Euratom Commission and they, in turn, would have to consult again and put it before the Council of Ministers, which is their legislative body.

Senator ANDERSON. Did the Knowland understandings and reservations completely upset the International Atomic Energy Agency? I thought it got along pretty well. It got set up, didn't it?

Mr. FARLEY. Senator, if there were some reservations attached by the Congress, it would require a determination case by case as to whether this would require a renegotiation or whether it simply limited the power of the executive branch to act in certain situations.

The latter case was the case with the International Atomic Energy Agency.

Senator ANDERSON. I yield to my lawyer over here.

Senator PASTORE. We are getting terribly confused here. Section 124, which has to do with the international arrangement, merely fixes the jurisdiction. Am I right?

Mr. SCHAETZEL. Yes, sir.

Senator PASTORE. Then, insofar as the agreement for cooperation is concerned, that is the agreement that has to come up here under section 123. Your working papers are not a predicate to 124. Your working papers are a predicate to the agreement for cooperation. Insofar as the agreement for cooperation is concerned, we have nothing to do with that, as a Congress, but to have it sit here for 30 days, and, if we don't take up positive, affirmative action, it becomes a consummated agreement. Am I right?

Mr. SCHAETZEL. That's right.

Senator PASTORE. Therefore, insofar as this international arrangement is concerned, you are merely, actually, setting the jurisdiction whereby the President can begin to negotiate this agreement for cooperation. Whereas, had you come up here under 121, you would not only have had the jurisdiction set; you would have had all the terms and conditions of the agreements made. The question I am asking is this: It would strike me—and I realize this is conjectural—that some of us on this Joint Committee have been a lot more enthusiastic and concerned about negotiating this Euratom agreement than some of the members in the executive department.

Because, for the life of me, if you have reached an understanding with Euratom, then why don't you come up under 121 and have it all done under this session of Congress. I am asking this question, and I am not trying to pitch a lefthanded curve at anyone. I am asking the question of you, Mr. Dillon, and of the Commission, to let me know what would be the objection on the part of the executive branch if the Joint Committee saw fit to fashion this under section 121 and do it altogether.

Chairman DURHAM. I think this legislation goes a little further than that because it authorizes financial support and that is outlined in the agreement.

Senator PASTORE. I realize that and that is the reason why I say this could all have been done under 121 and the Congress would have enacted it like we enact any law, and all the terms and conditions would have been spelled out, all the working papers would have been included in the provisions of the agreement and all the authorizations would have been included by the Congress because there definitely would have to be a concurrent action on the part of the Congress of the United States signed by the President. I don't understand why you didn't do it under 121. There is something odious to the executive department about this 121. I can't understand why you ever had it recommended in the law if you never expect to use it, and you have not used it. There has been a reluctance and hesitancy on the part of the executive branch to come in under 121. We had that all out with this exchange of information.

There, again, had you come under 121, we would have considered it in the Congress and done it in one package. Why you are breaking it up this way is beyond me unless it is because you want to go further when you come up with an agreement for cooperation than you expect to go now under your 124 route.

Mr. DILLON. Senator, I am not an expert on the Atomic Energy Act and was not familiar with this decision when it was made. But I am certain that the executive department would have no choice between the route that the Joint Committee or the Congress would feel was the best to take in order to bring this whole operation into being so it could proceed this year.

We may have been in error in suggesting the route suggested. I am perfectly ready to admit that. We did move under this 124 procedure and submitted the draft agreement, and included in the draft legislation which is before you a provision which would allow your committee by written action to waive any part of the 30-day waiting period. At the same time we are submitting to you in this package the 123 agreement for cooperation in initialed form. I am perfectly

ready to admit that may have been unnecessarily clumsy procedure, but the people who decided the legal procedure felt that was the intent of the legislation.

Senator PASTORE. It has always been my impression that the reason you were coming up under 124 is that you had not reached a definite understanding. But now I am hearing today you have on practically every detail. If that is the case, why don't you include it altogether? Why wait for the next Congress to come in with an agreement for cooperation? Why don't you do it now if you have an understanding? They are talking about reservation; I think it would be a great deal better to do it under your provisions than to write a general reservation under 124 because that would be tragic and disastrous.

Mr. DILLON. We don't intend to wait under this procedure for the next Congress. We had hoped if the Congress approved the proposed legislation the Joint Committee would waive the 30-day period. The agreement for cooperation would be submitted immediately after approval of this legislation, while the Congress was still in session, so you would have the opportunity to waive it, if in your study of the program at this time you felt that was the desirable thing to do. That is what we would urge.

That may have been a clumsy way of going about it.

I think we are shooting at the same end.

Senator PASTORE. It seems to be a very adept way of opening up old sores. It doesn't bother me. I would accept it that way. It always raises the suspicion that you don't put your cards on the table face up and have it all O. K.'d by the Congress. Why you are insisting that this be an executive action exclusively without joint cooperation and partnership with the Congress, that has always been rather irritating. It has not disturbed me. But it has disturbed other members of this Joint Committee, and I would think by this time you would have learned a lesson.

Mr. FARLEY. Senator, we thought that if we put all of the agreements under section 121 we would have gone far in tying the hands of Congress to give us any advice, or have any flexibility in considering the package.

Senator PASTORE. We are doing that this morning. You are telling us that is the agreement. You don't tie our hands. No one is being tied here. This is an agreement between the people of the United States and the people of the Euratom nations. We want a clear understanding on both sides, and once we have reached an agreement, why not sanctify it by a joint action on the part of the executive and the Congress? That is the way to do business. Then you avoid all this suspicion and criticism.

I will tell you very frankly I don't care how anyone else feels on this Joint Committee. I say for the peace of the world and a solution of the Middle East problem and to bring about a speedy research and development of power, Euratom is the best answer we have today.

I am one of those who would like to see it culminated as soon as possible. That is the way I feel about it. I feel rather strongly.

Mr. DILLON. Thank you, sir.

Chairman DURHAM. Senator Hickenlooper?

Senator HICKENLOOPER. I have no questions at this point.

Chairman DURHAM. Mr. Holifield?

Representative HOLIFIELD. In following out the line of thought of Senator Pastore, I find myself in disagreement with him. As I understand it, section 121 is the treaty route. While it would be possible to make similar treaties with a group of different nations, it seems to me that section 124 was written into the act specifically for you to proceed in just such a case as the Euratom case. It seems to me that it fits the case. Rather than deploring the flexibility which 124, I think, allows, I rather think that this probably will prove to be one of the most important parts of this arrangement.

I have certain technical questions which I plan to ask the Commission which will go into this matter further.

I would like to again be assured that the appendixes—first, I would like to be assured again that the working papers are not a rigid part of the international agreement. Am I correct in that?

Mr. DILLON. We can give you that assurance; yes, sir.

Representative HOLIFIELD. The appendixes occupy a little higher strata, do they not?

Mr. DILLON. Yes, sir.

Representative HOLIFIELD. Can I be assured that there is enough flexibility in your overall arrangement, including the first international agreement and the subsequent cooperation agreement which will be formed for you to amend, delete, or add to understandings which are contained in the appendixes, or are they so rigid that you cannot do that?

Mr. DILLON. No; they are not so rigid. Mr. Farley will speak to this.

Representative HOLIFIELD. May I rephrase my question so it will be a little clearer?

The appendixes were supplementary to the letter from former Chairman, Mr. Strauss. My question really is this: Are the appendixes a rigid part of the agreement which you are now asking us to approve?

Mr. FARLEY. Mr. Holifield, I understand the situation in this way. There are a number of different appendixes, one being an agreement for cooperation, and you are familiar with the status of this.

Representative HOLIFIELD. That's right.

Mr. FARLEY. Others represent understandings reached by the Government of the United States on a contingent basis, the contingency being action required by our statutes, by the Congress. If the actions by the Congress approve the documents submitted in the section 124 agreement, raise no objection to the coming into effect of the 123 agreement, and there is no additional legislative history, then there would be no change in our executive branch commitments. If the Congress either enters reservations to the 124 arrangement, persuades us that changes should be sought in the other documents, then we would have to go back to Euratom and its Council of Ministers to renegotiate any changes, but the nature of the action that would have to be taken would not necessarily be such as to prevent us from concluding them within the framework of the congressional action.

Representative HOLIFIELD. I am very much interested in seeing that if the agreement is confirmed that both Euratom and the United States be in a position of flexibility in regard to technological changes which

may occur during the next 4, 5, or 10 years. I have in mind one very specific point.

As I understand these agreements and appendixes, and so forth, this pretty well confines the types of reactors to the pressurized water reactor and the boiling water reactor. Assuming that we would come up with a drastically improved type of reactor within the next year or year and a half or 2 years, and we were embarked upon this program, and let us assume with a breakthrough in technology which would absolutely make it ridiculous to go on with an advanced type of the Shippingport reactor, I would certainly want to know—and I suppose this could be handled by a new agreement which could be presented to the Congress at that time but I would want it to be more flexible than that—that the two parties to the agreement could change from the PWR and the BWR to a new exotic type of reactor which might be twice as efficient or one-half the capital cost.

Mr. DILLON. Yes, sir. That is covered on page 33 of this committee print in an exchange of letters between the head of the Euratom organization and Mr. Cook, Deputy General Manager of the Atomic Energy Commission. The letter written on May 8 poses just about the same questions as you did and indicated that they hoped there was flexibility. The reply by Mr. Cook says that we agree that the program must be sufficiently flexible to provide for the consideration of other types of reactors in addition to the boiling water and the pressurized water varieties.

Representative HOLIFIELD. Yes; but I find a letter included in an appendix a poor substitute for a provision which could be obtained either in the international agreement or more preferably possibly in the agreement for cooperation. In other words, a specific provision for that.

Mr. DILLON. The agreement, as I understand it, applies to proven types of reactors.

Representative HOLIFIELD. That is true.

Mr. DILLON. This letter was merely meant to indicate that proven types meant what you have said, gave you flexibility so when a new type became proven you could use it.

Representative HOLIFIELD. I don't understand it that way. I understand your proven types to be those reactors which have produced such as the Shippingport reactor kilowatts. I am fairly sure in my own mind that by having that word proven in parts of your agreement, I am not content with this exchange in the letters myself that it does give you the flexibility. In such a rapidly changing technology, I feel we should have this flexibility. I feel this is a very important point and I will go into it more fully.

Mr. DILLON. The Atomic Energy Commission people will speak to this in detail.

Representative HOLIFIELD. If the committee does find that it is necessary to have more flexibility than is given in this exchange of letters, and there is a great deal of concern in some sections of the industry who believe if they have a reactor which is proven enough in their minds and in the minds of the buyers in Europe that they are willing to put their money into it, that they should not be precluded from gambling their money in something in which they are willing to put their money into just because of some rigid require-

ment which apparently freezes this into the pressurized water reactor or the boiling water reactor types.

Mr. DILLON. As I said, the Atomic Energy Commission will be prepared to speak to that in more detail.

Representative HOLIFIELD. Could that be written into the agreement for cooperation, or is that already a finished document?

Mr. DILLON. I think the document as such is meant to be a finished document. But certainly that could be taken as the understanding of the United States in carrying out the meaning of the document.

Representative HOLIFIELD. How could that be established? Would it have to be established by way of an amendment to the cooperation agreement?

Mr. DILLON. I don't think that would be necessary. It would merely have to be by a statement of the Congress that is the way they interpreted the terms of the agreement for cooperation. Certainly the European countries initiated this correspondence, they are interested in this flexibility, and would be glad to have it.

Representative HOLIFIELD. It would be to their advantage as well as ours.

Mr. DILLON. It would be to their advantage as long as they are sure that the one thing they do not want to do is to go into a really experimental type of development at this time. They want to be sure that they get the power because they have the need for power there.

Representative HOLIFIELD. I am going to suggest that our committee report on H. R. 13119, going into some detail on this proven type language that is in the bill, to change that to something which would give flexibility. As I understand you say there are 3 factors involved, 1 is the 121, the other is the 123, and the other I didn't get.

Mr. DILLON. The other one was the statutory provision.

Representative HOLIFIELD. I would like to leave that and go to the second indent on page 3, where you bring up the importance to Western Europe of establishing a nuclear power industry. I would like to explore that a little bit because I don't want the present trouble in the Middle East used as we sometimes find ourselves faced with a defense appropriation, there are stories in the newspapers citing Russian submarines off the coast. This usually comes a week or 10 days before the defense appropriation is voted.

This has a fine psychological effect on the people and the Congress sometimes, I am afraid.

I would like to explore this reference to the interruption to the pipelines of the oil in Western Europe. I would like to put the proper perspective on the amount of kilowatts which are expected here. As I understand it, there are about 110 million kilowatt capacity in the plants of the 6 nations.

Mr. DILLON. I would assume that is correct. I am not an expert on that myself.

Representative HOLIFIELD. Mr. Cook, I think you have those figures.

Mr. COOK. Yes, sir. The figure you quoted is for all of Western Europe, including the United Kingdom. For the Euratom countries alone it is about 60 million kilowatts.

Representative HOLIFIELD. How many million capacity installation does the Euratom proposal contemplate?

Mr. DILLON. This particular proposal is for 1 million. The report of the "three wise men" indicated a goal which they have adopted of 15 million.

Representative HOLIFIELD. I have been hearing about goals for kilowatt capacity for several years from the former chairman. I am more interested in realities than in goals.

Representative PRICE. This, then, would be the first increment of a much larger program; is that correct?

Mr. DILLON. That is correct.

Representative HOLIFIELD. Would that mean an increment in which we were supposed to take part on the same basis?

Mr. DILLON. No, sir; this is the extent of our program.

Representative PRICE. It would mean, though, under the language of this bill that the joint program would be based on 1 million kilowatt electrical capacity, and if you did participate further you would have to come for additional authorization; is that correct?

Mr. DILLON. That is correct.

Representative HOLIFIELD. The perspective of this million kilowatt capacity is about one-sixtieth of the nations in Euratom.

Mr. DILLON. That is correct.

Representative HOLIFELD. Therefore it could not be looked upon as being a substitute for their coal- and oil-generated power; could it?

Mr. DILLON. No, sir. I think I pointed out in that paragraph what they are trying to do is not to substitute for their oil, which would be much too difficult, but to find a substitute source of energy for some of the increased requirements for power which they face over the next few years. The proportion of this 1 million to that increased requirement is fairly substantial.

Representative HOLIFIELD. In other words, I don't want this to be looked upon as a solution to the Mideast oil problem or any appreciable part of the solution.

Mr. DILLON. No.

Representative HOLIFIELD. I hope any arguments that are made to that effect are made for psychological reasons and not for realistic reasons.

Senator PASTORE. I disagree with the distinguished gentleman. After all, we are still in a research and development stage. We are starting here with one megawatt. No one knows just how far-reaching this might be and if one day you can substitute atomic energy for oil why wouldn't you be solving the Middle East problem? It all depends how you want to argue this question. It is not the answer today but it could be the answer 50 years from today.

Representative HOLIFIELD. I agree with that. I hope we are all here 50 years from now and there is no Mideast problem.

Senator PASTORE. That is all I said.

Representative HOLIFIELD. The building of these plants will take until 1963. So that means again that the present unpleasantness in the Middle East will long either be solved or get into a worse condition before these plants would be putting any kilowatts on the line.

Mr. DILLON. That is true. I think the basis of this is that the European countries just felt that they were getting into a position where their whole industrial complexion was getting more and more dependent on sources of fuel that they had no control over and in

the future would never have any real control over. They felt that they wanted to develop over a long term a source which they could control and thereby safeguard a greater proportion of the energy requirements to keep their industries going.

This program is not based specifically on what has happened in the last few weeks. I say what has happened there highlighted the reasoning behind this but it has done no more than that.

This does not solve the present situation in the Middle East at all. This program is to enter onto a path that will in the future, the European countries feel, give them greater flexibility and less dependence on outside sources of energy.

Chairman DURHAM. I agree with the gentleman from California, and with you, Mr. Secretary, it doesn't solve the immediate problem. In fact it does do the same thing that all these things have done before, development for future needs. That is the primary purpose.

Mr. DILLON. That's right.

Represeentative HOLIFIELD. You have no assurance of the economics of these reactors, either. They are supposed to be improved types of the PWR and BWR, and the present prices of kilowatts produced by those types are many times more than the conventional fuel reactors. You may have hopes, and I notice you have a group of tables in the back of this which are estimates, but you have no real guaranties that this will be anywhere near the economic fuel value in Europe.

Mr. DILLON. I think the Atomic Energy Commission is better able to answer that than we are, but I think it is their feeling that this will meet the economic requirements of Europe given the various guaranties for the fuel cycle and so forth which we are proposing to make in this program.

Representative HOLIFIELD. Section 4 of the bill provides for $90 million, and that is for the purpose of firming up the prices on fuel and other charges such as processing, transporting.

Mr. DILLON. That provides for the use of up to that amount. The bill authorizes that use. As I understand it, there is a considerable amount of feeling—I would say hope—that they would not have to use that full amount. Again the Atomic Energy Commission will be ready to testify to that.

Representative HOLIFIELD. As far as we are concerned, we are estimating that much available.

Mr. DILLON. That is correct.

Representative HOLIFIELD. We estimate $50 million available for research and development.

Mr. DILLON. That is correct. The Europeans are making the same amount available for research and development, so it will be a program financed 50–50 by both sides, with the results available to both of us.

Representative HOLIFIELD. Have you had an estimtae on the value of the fuel inventory that will go into the six reactors?

Mr. DILLON. About a hundred million dollars, I am told.

Representative HOLIFIELD. Of course, the fiction of ownership means nothing as far as recovery is concerned because of the nature of the material and the international implications.

Mr. DILLON. I think the Atomic Energy Commission can speak to that, too.

Representative HOLIFIELD. So if we total that up, we have $240 million which it will cost the United States in terms of either material or services, and this does not include the losses which may occur in the processing, or is that included in the 90 million?

Mr. DILLON. That would be included, I would think. The hundred million dollars for the fuel inventory is in the nature of an advance and we have a commitment from Euratom to pay for it in the future. That is of a somewhat different order than the 90-million guaranty which, if we pay it out, is just a contribution on our part to make this possible.

Representative HOLIFIELD. Would the amount of plutonium which we might get out of the agreement be a credit against this, or would this be an additional purchase on our part?

Mr. DILLON. It would be an additional purchase on our part at the fuel value of plutonium which is lower than the price that we pay here.

Representative HOLIFIELD. $12, I believe?

Mr. DILLON. That's right.

Representative HOLIFIELD. For all purposes that would be an advantageous purchase as far as we are concerned.

Mr. DILLON. That is what I understand.

Representative HOLIFIELD. Are there any other costs involved in this that you know of?

Mr. DILLON. The only other cost is the loan that is proposed to be made by the Export-Import Bank toward the cost of constructing these facilities.

Representative HOLIFIELD. That is $135 million.

Mr. DILLON. Up to $135 million. The reason we say "up to" is that the estimates are not fixed as yet as to the cost of constructing these facilities. They range between $300 million and $350 million, and $135 million was the top figure based on the cost of $350 million to construct these facilities.

Representative HOLIFIELD. That is to be loaned at 4½ percent interest, I believe.

Mr. DILLON. That is right.

Representative HOLIFIELD. From the Export-Import Bank?

Mr. DILLON. That is correct.

Representative HOLIFIELD. Would you call that a conventional-type loan?

Mr. DILLON. I would say so; yes, sir.

Representative HOLIFIELD. In other words, the obligation for repayment is just as firm on that as it would be on any other type of international loan.

Mr. DILLON. That is correct.

Representative HOLIFIELD. Is there any provision to prevent the Euratom people from reloaning that money at a higher rate of interest to their members?

Mr. DILLON. The details of that loan have yet to be worked out between the Export-Import Bank and the Euratom people, and there undoubtedly will be provisions covering that point in the agreement when it is worked out.

Representative HOLIFIELD. The reason I asked that is that the rate of interest is quite a bit higher than in the United States.

Mr. DILLON. That is correct.

The funds undoubtedly will be reloaned to the individual units there at a somewhat higher cost but only enough higher to cover administrative cost, a very small percentage higher, which will be worked out definitely in the agreement.

Representative HOLIFIELD. Will that $135 million be an amortized loan or does that contemplate a long-term loan?

Mr. DILLON. That has not been completely specified, but the preliminary talks were looking toward a 20-year loan that would be regularly amortized like other Export-Import loans.

Representative HOLIFIELD. On the estimated $100 million inventory, do they pay us interest on that for the first 10 years?

Mr. DILLON. Yes, sir.

Representative HOLIFIELD. At what rate?

Mr. DILLON. Four percent.

Representative HOLIFIELD. And then it is amortized in the second 10 years.

Mr. DILLON. That is correct.

Representative HOLIFIELD. What about the burnup; do they pay us?

Mr. DILLON. They pay for that.

Representative HOLIFIELD. They pay for the burnup.

Mr. DILLON. Yes, sir.

Representative HOLIFIELD. And the replacement, reprocessing, fabricating, and so forth?

Mr. DILLON. That is correct.

Senator ANDERSON. Are you sure?

Mr. DILLON. That is the same thing we went into right at the beginning, Senator. That is the understanding.

Representative HOLIFIELD. That is all the questions I have at this time, Mr. Chairman.

Chairman DURHAM. On July 9, I wrote the Secretary of State Mr. Dulles a letter, and in that letter we asked this question:

> We also would like to receive information on how the State Department is organized to administer its responsibilities in the atomic energy field particularly in relation to Euratom. In that connection we would appreciate information of your relationship with the Atomic Energy Commission, the International Cooperation Administration, and the Executive Office of the President.

Could you give us an answer to that question?

Mr. DILLON. Yes. Taken in its parts, the primary organization in the State Department for handling atomic energy affairs rests in an office headed by the special assistant to the Secretary for atomic energy affairs. That is Mr. Farley who is here with me today. Mr. Schaetzel is a member of his staff. They coordinate within the Department and have primary responsibility for initiating and handling all policy matters regarding atomic energy within the Department of State.

They deal on a regular basis with the Atomic Energy Commission and with the ICA when the ICA has an interest. As far as this Euratom program is concerned, the ICA has no interest whatsoever. In the whole atoms-for-peace program, the ICA does have an interest primarily in technical training and in the furnishing of some technical equipment. We have an agreement which I would be glad to submit for the record, indicating the detailed arrangements regarding the atoms-for-peace program, the responsibilities by ICA, AEC, and

State Department. As the atoms-for-peace program is a part of the mutual security program, the overall guiding responsibility rests in the Department of State.

We will be glad to submit that for the record.

As far as the Executive Office of the President is concerned, if that refers to the new special assistant to the President for atomic-energy affairs, it is my understanding that he has no interest or responsibility in administration or operation of programs. This Euratom program would rest with the Department of State and the Atomic Energy Commission. His work is simple to do with policy advice.

Chairman DURHAM. This group will continue to operate under you after the act is passed.

Mr. DILLON. This group within the State Department does not operate directly under me any more than they do directly under any other one of the senior officers in the Department. When it is an economic matter they come to me. If it is a policy matter regarding weapons they go to someone else. They go to the Secretary or Governor Herter.

Chairman DURHAM. Mr. Price.

Representative PRICE. I have no questions at this point.

Chairman DURHAM. Mr. Hosmer?

Mr. HOSMER. Following up Senator Anderson's line of inquiry about payment for the uranium, we know that the first 9,000 is on a time-payment plan but the other 21,000 we were not able to find the specification in the working paper. Directing your attention to page 29 of the proposed agreements at the draft bill, end of section 5, which authorizes the AEC to distribute this 30,000 kilograms, could we add to that with a statement as to the 9,000 on the easy-credit plan and the rest cash on the barrelhead, and could it be done without violating or interfering with or in any other manner causing your arrangement which has been made to be disturbed?

Mr. DILLON. I would think it could; yes, sir.

Mr. HOSMER. That is all, Mr. Chairman.

Chairman DURHAM. Senator Anderson.

Senator ANDERSON. At the time the negotiations were going on with the European Community, did the representatives of the United States offer to pay $30 for the buyback for plutonium instead of the fuel price?

Mr. DILLON. Mr. Schaetzel, who was in those negotiations said that there was some discussion of that but we never made any such offer, as an offer.

Senator ANDERSON. You didn't suggest a $30 price and the European Community refused it on the ground that they wanted this for peaceful purposes?

Mr. SCHAETZEL. That is why I said the matter was discussed with them and they said categorically they were not prepared and could not under the terms of the treaty make material available for military purposes. Hence, even the possibility of our buying the material back at $30 for unrestricted use is something they could not consider.

Senator ANDERSON. Your answer to my question was "that's right." I said you did not offer to pay $30 and they did not refuse to do so, and you said "that's right."

Mr. SCHAETZEL. My answer was turning on the word "offer," as to whether we went to them with instructions to say we were prepared

to offer $30 for plutonium. In the early examination of this program, the objective of which was to get the cost of energy down to tolerable limits so that the utilities would invest their funds in it, obviously one of the possibilities would have been a $30 price for plutonium. There was never an offer made nor were there any instructions to the delegation to put such a proposal before the Euratom officials. It never reached the point of anything which could be remotely called an offer.

Senator ANDERSON. Why would they say that they couldn't do it that way?

Mr. SCHAETZEL. For several reasons, Senator. One was because certain of the utilities which were interested, outside the program, in constructing a nuclear power reactor had proposed that one of the arrangements which would make such a project more attractive would be if they could get the same price for plutonium which domestic projects could in the United States. So the idea of $30 was current among the utilities and industries in Europe.

Senator ANDERSON. But the industries in the United States get it only until 1963. Are these reactors going to be operating before 1963?

Mr. SCHAETZEL. No, sir.

Senator ANDERSON. Then why would the United States industry have it? I don't believe they will have it.

Mr. SCHAETZEL. This may be a point that escaped the European utilities, Senator.

Senator ANDERSON. The offer did not come from the United States.

Mr. SCHAETZEL. No, sir.

Senator ANDERSON. Are you sure? I have discussed this point with some people that I thought were acquainted with this in the European Community. You were there and no such suggestion was made.

Mr. SCHAETZEL. I was, sir. I know the instructions we had. In fact the instructions ran the other way. The instructions to our delegation were that we could not consider the $30 price for plutonium.

Senator ANDERSON. Could those instructions be made a part of the record? Never mind, I will withdraw the question.

Chairman DURHAM. Mr. Van Zandt.

Mr. VAN ZANDT. I have no questions.

Chairman DURHAM. We have an appropriation bill coming up on the floor of the House this morning, so we will have to adjourn earlier. We have not reached the point with respect to safety and inspection. Does the committee want to have the State Department back on this question of inspection or just submit the statement for the record. Without objection the statement on inspection will be submitted for the record.

(The document referred to follows:)

TESTIMONY OF UNDER SECRETARY DOUGLAS DILLON WITH RESPECT TO THE SAFEGUARD ARRANGEMENTS OF THE JOINT UNITED STATES-EURATOM PROGRAM

The specific undertakings necessary to assure that United States material will be used only for peaceful purposes are set forth in the letter of June 23 from the Chairman of the AEC to the Joint Committee.

The essential elements of these undertakings are: The Community will give full and effective guaranties that United States material will be used only for peaceful purposes, as required by the Atomic Energy Act. Full responsibility for insuring the effectiveness of these guaranties rests on Euratom. Euratom, under its treaty, has authority to discharge this responsibility.

From the United States point of view, the President, on the advice of the AEC and the Department of State, has found that these arrangements are in the interests of the United States and its security. The draft agreement which has been initialed contains extensive arrangements for United States assistance to Euratom in establishing their safeguard system; consultation over the course of the agreement so that both parties may be assured of the effectiveness of the system; and should question arise with respect to the effectiveness of the Euratom safeguard system, we have the right under the draft agreement to withdraw from the program.

I call your particular attention to the June 18 exchange of letters between Ambassador Butterworth and Mr. Kohnstamm. These letters elaborate the provisions of the agreement on the principle of reciprocity, which is implicit in the entire program. The letters further affirm that each party has permission to verify by mutually approved scientific methods the system used by the other to assure that the program serves exclusively for peaceful uses of atomic energy. Related to this exchange of correspondence is a letter of the same date from the Atomic Energy Commission which states in categorical terms that the United States will restrict any plutonium it acquires under the program exclusively to peaceful uses.

Under the Euratom Treaty, six nations have established a new European institution, which they have endowed with special authority and power. The Euratom Treaty explicitly imposes upon the Community the responsibility for developing a comprehensive accountability and control system. In order to strengthen the hand of the Community in carrying out this responsibility the treaty further provides that special nuclear material produced within or imported into the Community, must be the property of the Community, not of the member states.

In the field of atomic energy control the Euratom system has two significant elements: First, it is an international or multilateral control arrangement, run by a new international civil service subject to the Community. This means that nationals of the six countries will be inspecting each other. Second, the Community's supranational accountability authority covers all special nuclear material produced within or imported into the Community.

Important to any consideration of the safeguard arrangements in this agreement is the fact that they are part of a large, joint United States-Euratom program of clear benefit to each party. Mutuality of interest and support is one of the principal strengths of the program. The safeguard undertakings are rooted in our equal interest in developing sound safeguard principles and techniques designed to prepare the way for the goal of a truly international, all-inclusive, system of control over nuclear activities everywhere. It seems to me a great credit to the Europeans that they have developed a treaty fixing for the first time authority for effective control of nuclear material in an institution superior to its member states, a step taken on their own initiative and not in response to external suggestion or pressure.

The fact that the Community is composed of nations which are intimately associated with the North Atlantic Defense Organization and fundamentally committed to the West's opposition to Communist aggression has led to bitter attacks on Euratom by the Soviet bloc. The Soviet Union has carried its opposition into the Board of Governors of the International Atomic Energy Agency where they attempted to block the proposed association of Euratom with the Agency. Nonetheless, under the agreement elaborating the joint program, the Community has committed itself to develop a safeguard system reasonably compatible with that of the International Agency, and to undertake a continuing exchange of information with the Agency with respect to safeguards and controls and other aspects of the joint program. Both United States and Euratom state explicitly in the memorandum of understanding, and also in the draft bilateral agreement for cooperation, their mutual interests in furthering the goals of the Agency. And finally, in the event of the establishment of international inspection system by the Agent, Euratom and the United States will consult regarding assumption by that Agency of the safeguard and control over the fissionable material utilized in implementation of the program.

At such a time that a basic agreement with the Soviet Union is reached for effective international control of fissionable material, which we have earnestly sought over the last 10 years, the Community has not only expressed its intention to fit the Euratom comprehensive regional control arrangement into such a system, but the Community further will be in a position to do so quickly because of the progress it will have made through developing accounting procedures for all the material produced by or imported into the Community. Furthermore, under terms of the agreements before the committee, the Community's system of accountability will have been developed in a manner compatible with the techniques devised by the Agency.

In conclusion, I am convinced of the positive merits of these arrangements. The President is required under the act to determine that there is no unreasonable risk to the common defense and security, a determination which is never pro forma. In this case, the entire proposal was reviewed minutely and it is the considered judgment of the executive branch that Euratom arrangements actually strengthen our common defense and security.

This is the first occasion where a major nuclear power complex will be subject to a system of full, international safeguard and control. The experience gained in devising and operating such a comprehensive control system will be of great benefits to the other nations—and to the IAEA—having a similar interest in effectively safeguarding atomic energy development. The ultimate objective, of course, is a worldwide system encompassing all fissionable material. The Euratom regional control arrangement could be a key element in any future system. It is pertinent to quote here from a letter to Secretary Dulles of June 23 from Louis Armand, president of the Euratom Commission:

"Let me at last say a word about the control problem. In our perspective the understanding which we have reached concerning the guaranties and safeguards represents not only an indispensable consequence of the responsibilities attributed to the Commission by the Euratom Treaty, but it is also a manifestation of our intention to promote the principle of a truly international control system. For, as I believe, it is the Euratom system in which for the first time the basic pattern of any international control system shall be realized, which consists in the absolute reciprocity, by which citizens of different nationalities will inspect and control nuclear establishments in other countries than their own. For this reason the IAEA in Vienna can count on our support in the endeavor to establish a truly worldwide system of control."

(For a comparison by AEC of safeguard arrangements in the proposed Euratom agreements and those found in typical United States bilateral agreements, see p. 236. Ed.)

Chairman DURHAM. Thank you very much, Mr. Secretary.

Mr. DILLON. Thank you, Mr. Chairman.

(Whereupon, at 11:50 a. m., Tuesday, July 22, 1958, the hearing was adjourned, to reconvene Wednesday, July 23, 1958, at 10 a. m., in room 314, Senate Office Building.)

PROPOSED EURATOM AGREEMENTS

WEDNESDAY, JULY 23, 1958

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met, pursuant to recess, at 10 a. m., in room 314, Senate Office Building, Hon. Carl T. Durham, chairman of the committee, presiding.

Present: Representatives Durham, Holifield, Price, Van Zandt, and Hosmer; Senators Anderson, Pastore, and Hickenlooper.

Also present: James T. Ramey, executive director; David R. Toll, staff counsel, George E. Brown, Jr., George F. Murphy, staff members; Capt. Nels Nelson, United States Navy, consultant, Joint Committee on Atomic Energy.

Chairman DURHAM. The committee will come to order.

This is the second day of public hearings by the Joint Committee on Atomic Energy on the proposed Euratom agreement.

Yesterday the committee received the views of the Department of State on the proposed agreements and this morning we will hear from representatives of the Atomic Energy Commission.

I understand Commissioner Floberg will make the formal presentation for the Commission and the members of the AEC staff are present to assist in answering detailed questions which may arise.

Before we start, I would like to call the attention of the committee members to the fact that we have three basic documents for consideration in connection with the Euratom program.

First, the intentional agreement on page 13 of the committee print, which must be approved by the Congress in the form of a concurrent or joint resolution under section 124 of the Atomic Energy Act.

Second, the proposed authorizing legislation at page 29 of the print and contained in H. R. 13119, and S. 4047, which authorizes funds for the joint research and development program and the fuel-element guaranties.

It also authorizes waiver of the 30-day waiting period on the agreements for cooperation.

Third, the agreement for cooperation at page 22 of the print, which covers the proposed program. This proposed agreement cannot be submitted until the international agreement is approved. It cannot be made effective at least in total unless the authorization legislation is enacted and funds are appropriated.

Mr. Floberg, are you going to come around, or will you sit back there?

Mr. FLOBERG. I would rather sit here.

Chairman DURHAM. All right, if we can hear you.

Mr. FLOBERG. You will be able to hear me.

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STATEMENT OF HON. JOHN FLOBERG, COMMISSIONER, ACCOMPANIED BY RICHARD W. COOK, DEPUTY GENERAL MANAGER; FRANK K. PITTMAN, DIRECTOR, OFFICE OF INDUSTRIAL DEVELOPMENT; AND W. K. DAVIS, DIRECTOR, DIVISION OF REACTOR DEVELOPMENT, ATOMIC ENERGY COMMISSION

Mr. FLOBERG. Mr. Chairman, this is a long statement. I propose to stop at the end of each section and solicit the questions of the committee on that section.

I believe that gives you the opportunity of making the most orderly record in this presentation, if you and the committee have no objection.

Senator PASTORE. Just so you will last, you have a beautiful voice that carries well and you do not have to raise it at all.

Chairman DURHAM. If there is no objection you may proceed in that order.

Mr. FLOBERG. Mr. Chairman, it is a pleasure to appear before the committee today to discuss the proposed cooperative program with the European Atomic Energy Community.

I am accompanied by certain members of the Commission's staff who participated, with their colleagues in the Department of State, in the negotiations.

In their statements before this committee, Mr. Dillon and the other representatives of the Department of State outlined the extreme importance that the executive branch places on the proposed cooperative program with Euratom in the light of the vital contribution it promises to make to our major foreign-policy objectives in Western Europe.

They also underscored some of the important benefits the United States may gain from participating in the proposed program.

In the course of my remarks I would like further to discuss the major elements of the program and to explain the motivations that led to their development.

I also will mention the legislative actions that will be necessary this session if the program is to get underway in time to meet the objectives that have been established.

More importantly, I would like further to stress the important contributions that I believe the program will make to foster the development of economic nuclear power.

My colleagues and I in the Commission have reviewed the proposals before you, carefully and at length. We believe that they will make possible one of the most significant and concrete achievements in the development of the atoms-for-peace program since the President made his address before the United Nations on December 8, 1953, which resulted in the establishment of the International Atomic Energy Agency.

In formulating the program, we had the benefit of the views of private industry concerning the problems they faced and their views as to the steps that were necessary to assure the early sale of United States nuclear reactors abroad.

On July 8, the Commission held a meeting with a group of representatives of United States nuclear industry to explain the proposed program with Euratom. It was our impression that industry is in favor of the program.

Are there any questions on that preamble?

Senator ANDERSON. Could you tell us who the representatives of the industry were that were in? Could you file that for the record?

Mr. FLOBERG. Yes, sir; we had a large group.

Chairman DURHAM. Without objection, that may be placed in the record.

(The information referred to follows:)

ATTENDANCE OF INDUSTRY MEMBERS AT MEETING ON EURATOM, JULY 8, 1958

ACF Industries, Inc., 508 Kennedy Street, Washington, D. C.:
Durante, Raymond W.
Hawkins, William M.
Alco, Schenectady, N. Y.:
Leggett, Adm. Wilson Durant
Allis-Chalmers, Milwaukee, Wis.:
Klecker, Raymond W.
Tally, Otho V. (Washington)
American Standard, Mountain View, Calif.:
Parker, Frank A.
American Machine & Foundry, 1701 K Street NW., Washington, D. C.:
Snapp, Roy B.
Associated Nucleonics, 975 Stewart Avenue, Garden City, N. Y.:
Kelley, Wilbur E.
Atomic Industrial Forum, 3 East 54th Street, New York, N. Y.:
Allan, Aley
Atomics International:
Balent, Ralph
Flaherty, John J. (Canoga Park, Calif.)
Sehnert, Robert H. (Washington)
Starr, Chauncey (Los Angeles)
Babcock & Wilcox Co., 161 East 42d Street, New York 17, N. Y.:
Horgan, Everett F.
Bechtel Corp., 1625 Eye Street NW., Washington, D. C.:
Shaw, Arthur L.
Yates, J. Perry (San Francisco)
Combustion Engineering, Inc., 200 Madison Avenue, New York, N. Y.:
Acker, Fitzgerald D.
Anderson, John B. (Windsor, Conn.)
Mansfield, John K. (Windsor, Conn.)
Norris, George, Jr. (New York)
Ebasco Services, Inc., 2 Rector Street, New York, N. Y.:
Ott, Henry C.
Reichle, Leonard F. C.
H. K. Ferguson Co., 11th and Walnut Streets, Cleveland, Ohio:
Heller, Edward
Thompson, Wells N.
General Atomics, Washington, D. C.:
Rolander, C. Arthur
General Electric Co.:
Freeman, Raymond C. (Washington)
Heimann, Fritz F. (San Jose, Calif.)
White, George (San Jose, Calif.)
GE International:
Rekemeyer, Charles E. (Washington)
Schelke, Charles V. (New York)
Kaiser Engineers, 1924 Broadway, Oakland, Calif.:
Shaw, David F.
The Lummus Co., 1001 Connecticut Avenue NW., Washington, D. C.:
Marvin, Marcus
Metals & Controls, Attleboro, Mass.:
Wilson, Carroll L.
Nuclear Materials & Equipment Corp., Apollo, Pa.:
Shapiro, Zalman M.

Nuclear Development Corporation of America, White Plains, N. Y.:
Menke, John Roger
Schwartz, Howard
Nuclear Metals, Inc., Cambridge, Mass.:
Willis, H. Hugh
Pickard, Warren, Lowe, 1518 K Street NW., Washington, D. C.:
Pickard, James K.
Sylvania-Corning Nuclear Corp., Bayside, N. Y.:
Cohen, Howard M.
Davenport, Lee L.
Vitro International, 261 Madison Avenue, New York, N. Y.:
Spector, Norman A.
Westinghouse Electric Corp., 40 Wall Street, New York, N. Y.:
DeCubas, Jose
Witzke, Raymond L. (Pittsburgh)
State Department, Washington, D. C.:
William A. Chapin
Arthur A. Hartman
Robert Schaetzel

Mr. RAMEY. You said you had industry in after the agreement was submitted, but there was no actual consultation with industry in the development of the proposals themselves.

Mr. FLOBERG. There is the usual constant contact with industry, but I don't believe—I know there was no seminar, anything like that, before the agreement was formulated.

But there is always a day-to-day contact with industry.

Mr. RAMEY. We have received a number of comments from industry that it was somewhat strange that this was supposed to be a program for the benefit of American industry, and yet there was no organized consultation with them in connection with the development of the program.

Mr. FLOBERG. It doesn't seem strange to me, Mr. Ramey. I think it would be most cumbersome if we tried to have a big seance every time we tried to undertake a big negotiation like this.

I think industry was considered throughout the negotiation.

Senator ANDERSON. If you did not talk to them, how did you know what their views were?

Mr. FLOBERG. We are in daily contact with them, Senator.

Senator ANDERSON. On Euratom?

Mr. FLOBERG. On the overall problems.

Senator ANDERSON. On the overall problem of Euratom.

Mr. FLOBERG. Yes, sir.

Senator ANDERSON. Doesn't it seem strange that nobody thought to talk to the Joint Committee at any time? If you were consulting the industry right along, why at some stage of the game, why did you not consult the Joint Committee which is supposed to be kept currently and fully informed?

Mr. FLOBERG. I was present at a meeting with the Joint Committee 6 or 8 weeks ago.

Senator ANDERSON. After the whole document was finished, that is right. There was only one little item left and that was the security and inspection item.

Mr. FLOBERG. Well, it was pretty well formulated, I agree with that, but this did not come as any surprise to the Joint Committee, I am sure, at that time.

Senator ANDERSON. I cannot speak for the others. I know it came as a little surprise to me. I got no previous briefing.

Mr. FLOBERG. I believe, Senator, that our staff had met with the Joint Committee staff from time to time during the course of the negotiations.

Mr. DURHAM. This is true, but we were never supplied with drafts of any of the documents.

Senator PASTORE. We did have some contact with the three wise men, when they came here.

Mr. FLOBERG. Shall I proceed, Mr. Chairman?

Chairman DURHAM. Proceed.

A. NEED FOR NUCLEAR POWER IN EUROPE

Mr. FLOBERG. The Department of State in its presentation noted the gravity of Europe's increasing dependence on fuel imports as well as the indispensable role that nuclear power can play in solving this problem.

In their report, a Target for Euratom, the Committee, composed of Messrs. Armand, Etzel, and Giordani, analyzed the current and projected energy requirements in the Federal Republic of Germany, Italy, France, Belgium, the Netherlands, and Luxembourg. They concluded that the economic growth of these countries was in danger of being seriously hampered by the lack of another source of energy. At the time their report was written the Committee found that the 6 countries were importing the equivalent of 100 million tons of coal per year, or nearly a quarter of their energy supplies. These imports are expected to double in 10 years and treble in 20 unless an alternate source of energy is developed. The Committee also recognized that Europe's increasing dependence on fuel imports would place her in an ever more hazardous position because of the instability of some of her existing sources of supply. Their analysis of the various available alternatives led them to conclude that Europe could stem this rising tide of insecurity by building nuclear, instead of new conventional power stations using imported oil or coal. The objective would not be to reduce coal and oil imports which are expected to rise with the growth of Europe's population and energy requirements, but simply to stabilize them at a reasonable level. It was recommended, accordingly, that the 6 countries of Euratom strive for the installation of 15 million kilowatts of nuclear power capacity in the next decade. This achievement would stabilize fuel imports in the Community to around 165 million tons of coal equivalent a year.

At the time the study was made it was recognized that the nations involved would be able to approach this ambitious objective only through a pooling of their efforts in the emerging Atomic Energy Community and only then with the help and guidance of the more technologically advanced countries such as the United States, the United Kingdom, and Canada.

In the course of our recent discussions with the representatives of Euratom, on the proposed program, there was occasion for a reappraisal of the European scene a year after the publication of A Target for Euratom. Although, some conditions naturally have changed since the report was written—the transportation costs of con-

ventional fuels have dropped—the assumptions in A Target for Euratom are still fundamentally sound.

As a result of their review of the situation today, the representatives of Euratom are in accord that a large scale nuclear power program must be launched immediately. Over the past year the member states in the Community have become increasingly aware of their common energy problem and there is agreement among the member states that nuclear power is an indispensable solution. At the same time, however, there is a fear that a lack of widespread experience in the Community with full-scale commercial reactors may threaten to delay getting such a program underway.

Chairman DURHAM. Any questions on this section?

Senator PASTORE. I have one question. Are you familiar with the draft agreement that brings the Euratom nations together?

Mr. FLOBERG. The treaty?

Senator PASTORE. The treaty.

Mr. FLOBERG. I am generally familiar with it, Senator.

Senator PASTORE. I am not going to ask any questions on it. As a matter of fact, I have never read it, myself. I was wondering if it would not be a good idea to submit one if there is one available so that we can incorporate it in the record by reference.

Is that satisfactory to you, Mr. Chairman?

Chairman DURHAM. Without objection, it may be done. (A copy of the Euratom Treaty is on file with the Joint Committee.)

Mr. RAMEY. I think the Commission has a statement here which gives some of the background as an attachment to the letter. (See appendix, p. 400.)

Senator PASTORE. I mean the whole agreements themselves. What are their agreements among themselves? It might be important for us to know that.

What have they done, themselves, about plutonium and their own natural supply of uranium?

Mr. FLOBERG. We will be glad to furnish a copy of the treaty.

Senator PASTORE. It would be well to know that.

Chairman DURHAM. All right, proceed.

B. MAJOR OBJECTIVES OF THE PROGRAM

Mr. FLOBERG. The program now before you is the product of a Joint United States-Euratom Working Party which was established last March. When this group was appointed it was charged with the task of developing the type of cooperative program that would be most meaningful, at this time, to the United States and the Community.

In the discussions that took place with representatives of Euratom it was agreed that the industries of Europe would have to obtain some immediate experience in the operation of full-scale nuclear powerplants if they were to move ahead in pursuit of the longer range objective of building the number of nuclear power stations which Europe required to meet its anticipated energy demand. It was also recognized that the United States would have much to gain if it closely associated itself with the European effort to gain such experience. As a logical first step, accordingly, it was concluded that it would be in the interest of both the Community and the United States im-

mediately to undertake the joint sponsorship of a program that would have as its objective the rapid installation of a limited number of large-scale reactors which would serve to provide technological foundation for a larger scale program to follow. This program would be designed to prove the economic feasibility of nuclear power through actual operation rather than by theory and calculation. It would be designed to provide the European utilities and supporting industries involved with the experience required before they could accept nuclear power with confidence.

In establishing the magnitude of this initial program it was agreed that it had to be large enough so that—

(*a*) The data produced would come from a sufficiently large enough number of reactors to be meaningful and would have statistical significance;

(*b*) A significant number of European industries would be afforded an opportunity to participate in the construction; and

(*c*) A sufficiently large number of operating utilities would be brought into the program to assure that the management of this industry would be ready to accept nuclear energy and enter the longer range program with enthusiasm.

Taking into account the nuclear-power projects already being planned within the various countries of Euratom the joint working group concluded that a program having a total installed capacity of approximately 1 million kilowatts of electricity, properly distributed among the participating nations would be most effective.

The working party also agreed that the program should be timed to be consistent with, and, in fact, a point of departure toward the program outlined in a target for Euratom for installing 15 million electrical kilowatts in the community within roughly a decade. To meet this objective the projects would have to be selected no later than 1959 with construction to be completed by 1963.

We recognize this goal is ambitious, but we believe it can be achieved.

Lastly, since the program would be designed to prove the economic feasibility of nuclear power in Europe and develop an industrial complex necessary for expansion, it was agreed that it should be based on reactor types which already had been technically proved within the United States.

For the reasons I have mentioned it was concluded as stated in memorandum of understanding that the first major objective of the proposed program should be—

> To bring into operation by 1963, within the European Atomic Energy Community, large-scale powerplants using nuclear reactors of proven types, on which research and development has been carried to an advanced stage in the United States, having a total installed capacity of approximately 1 million kilowatts of electricity and under conditions which would approach the competitive range of conventional energy costs in Europe.

I should like to say a few words about the meaning that we attach to the phrase "reactors of proven types" which appears in the stated objective I have just read. In using this term we have in mind reactor types in which we have had sufficient technical and operational experience on an experimental and developmental scale to justify our proceeding with reasonable confidence toward the construction of the contemplated full-scale plants. The operation of the facility involved will have shown that no major unsolvable technical problems exist and

that the reactor will be capable of reliable and safe operation. By using the term we mean a reactor type which has been shown to be technically feasible and one in which the economic uncertainties lend themselves to resolution through the normal industrial process development techniques without dependence on a major breakthrough.

Senator ANDERSON. Could we ask a question there?

Is it safe to say that the decision to use reactors of proven types pretty well ties it down to two American manufacturers?

Mr. FLOBERG. No, sir; I would say it would not be a safe assumption.

Senator ANDERSON. What others besides GE and Westinghouse would you think had developed proven reactors, reactors of proven types?

Maybe I can start it out this way: Does this limit this to pressurized-water and boiling-water reactors?

Mr. FLOBERG. Not in the view of the Commission.

Senator ANDERSON. What is the view of the Commission and what other types have been proven by their experience?

Mr. FLOBERG. First of all, I must point out to you this must be a joint determination in any case whether a reactor is a proven type. It must be joint with Euratom.

The Commission has taken the position and has corresponded with Euratom to express its opinion that the organic-moderated reactor has a sufficient background of experience now to fall within the definition of a proven type of reactor.

Senator ANDERSON. Do we have some side agreements in that we do not know anything about? Are all these documents in front of us, the memorandum of understanding?

Mr. FLOBERG. This is not a part of the memorandum of understanding. This is a letter dispatched last Saturday.

Senator ANDERSON. Should it not be in the record?

Mr. FLOBERG. We will put it in the record.

Chairman DURHAM. Without objection it may be placed in the record.

(The letters referred to follow, together with attached correspondence:)

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington, D. C., July 18, 1958.

HON. W. WALTON BUTTERWORTH,
United States Representative to the European Atomic Energy Community, Luxembourg Ville, Luxembourg.

DEAR MR. AMBASSADOR: As you will recall, in the course of formulating the proposed joint United States-Euratom program, the representatives on the respective delegations explicitly recognized that the organic moderated reactor concept might qualify for inclusion in the program as a reactor of "proven type."

This possibility was further specifically recognized in a subsequent exchange of letters between Mr. Kohnstamm and me. Mr. Kohnstamm in his letter to me dated May 8, 1958, stated in part:

"In terms of the current state of technology this would mean that initially the program would be oriented primarily toward large-scale nuclear powerplants employing reactors of pressurized and boiling-water types. I emphasize the word 'primarily' inasmuch as I believe that it would be unwise to forego the consideration of other types of reactors (e. g., the organic moderated concept) that may meet the criterion of 'proven type' developed in the United States and thus meet the objective of the joint program."

In my reply to Mr. Kohnstamm on June 12, 1953, I stated in part:

"We agree that the program must be sufficiently flexible to provide for the consideratiton of other types of reactors in addition to the boiling-water and pressurized-water varieties."

At the time of the Luxembourg discussions, the results on the operation of the organic moderated reactor experiment (OMRE) were quite encouraging, but it was recognized that decisions regarding inclusion of this type of reactor in the joint program as a "proven type" must await the accumulation and evaluation of further data from OMRE operation. In the 3½ months since that time, the OMRE has continued to operate in a highly successful manner and much significant data have been collected on the radiation stability of the tarphenyls used as moderator and coolant in the reactor.

We have analyzed these data and have concluded that the concept of organic moderation and cooling has been developed to the point where it should be considered on the same basis as boiling and pressurized water reactors for projects under the joint million-kilowatt program.

As I am sure you appreciate, the interpretation which we and Euratom place on the phrase "proven type" is a matter of considerable interest both to American industry and to the Congress. In answer to questions by Atomics International, the major proponent in this country of the organic moderated concept, we have made it clear that any determinations of the type of reactors which will be eligible for consideration under the joint program must be made jointly by ourselves and Euratom, and we have also stated that we cannot prejudge the actual competition of the program at this time since this will depend upon a comparative evaluation of the proposals actually received. We have, however, officially informed Atomics International that should the organic moderated concept be accepted under the program, we would be willing to extend to stainless-steel-clad oxide elements used in such reactors the same guaranties which we are prepared to offer to these elements in water reactors.

I would appreciate it very much if you would discuss this matter with Mr. Kohnstamm with a view toward determining whether he and his associates agree with us that the organic moderated concept should now be added to pressurized and boiling water concepts as reactors eligible for consideration under the million-kilowatt joint program.

I understand that recently a number of technical members of the Euratom staff, including Dr. Guarea, were thoroughly briefed by Atomics International representatives and that they are, therefore, familiar with the current status of OMRE operations and Atomics International current thinking on the concept. The attached letter, and summary technical report, from Dr. Starr, vice president of North American Aviation, Inc., of which Atomics International is a division, may be helpful as supplementary information on the subject.

If further information is needed, I will be very pleased to try to obtain it.

Sincerely yours,

R. W. COOK,
Deputy General Manager.

ATOMICS INTERNATIONAL,
A DIVISION OF NORTH AMERICAN AVIATION, INC.,
July 10, 1958.

MR. RICHARD W. COOK,
Deputy General Manager,
United State Atomic Energy Commission, Washington, D. C.

DEAR MR. COOK: With reference to our letter of July 8, 1958, requesting that the organic moderated reactor be included in the Euratom program as an acceptable reactor type, it may be relevant to briefly review the technical factors which have brought this reactor to its present state of availability on a firm price and guaranteed performance basis.

Basically the organic moderated reactor contains a hydrogeneous moderated and cooled core, heterogeneously fueled with slightly enriched uranium, that is very similar physically to that of a pressurized water reactor. In the case of the OMR, the moderator and coolant is a hydrocarbon mixture of terphenyls which replaces the water used in the PWR. At the design operating conditions of both types (which are very similar as to temperatures) the density of hydrogen in the terphenyl is about the same as in the pressurized water. The use of the terphenyl simplifies the reactor design because it permits reactor operation at low pressures, and due to its noncorrosive characteristics, permits the use of aluminum and ordinary steels.

The stainless-steel-clad fuel elements designed for use in the PWR may also be used in the OMR. Further, the terphenyl does permit the use of slightly enriched uranium metal and its alloys, which are generally avoided in water reactors for chemical reasons, so that such metal elements can be used in the OMR in addition to the uranium oxide fuel.

As a result of its similarity to the PWR, and the design simplifications resulting from the use of the organic liquid, much of the existent light water reactor technology, control methods, and operative experience can be usefully applied to the OMR. Further, the petroleum industry has for many decades utilized standard "hot oil," pumps, heat exchangers, valves, and similar plant equipment to process hydrocarbons at the temperatures appropriate to OMR operation. An industrial survey of such equipment (Mine Safety Appliance Co., contract No. bs–65426, index NS–200–021, Technical Reports 52 and 56) has indicated that organic systems operating in the range of 700–800° F. are industrially prevalent, reliable, and that many organic-water or steam heat exchangers are in constant use. This has been further confirmed by the readiness of component manufacturers to quote firm prices on such equipment. The OMR, therefore, does not require extensive engineering development of the heat transfer system and components, which is generally one of the most time-consuming and costly areas of reactor technology.

For the above general reasons, the only significant question that needed to be resolved to establish both feasibility and economics of the OMR pertained to the radiation stability of the terphenyls and associated effects under reactor operating conditions. Recognizing this situation, the AEC in 1955 authorized the organic moderated reactor experiment to explore this question.

At this time the more than 6 months of unusually successful operation of the OMRE have demonstrated that the radiation stability of the terphenyls is better than was expected from previous "in-pile" small-scale results. The data from this operation are discussed and analyzed in the attached memorandum.

Further, confidence in the OMR type which was based on previous reactor and petroleum industry experience was amply confirmed by the actual operating experience of the OMRE. Since the reactor first started power operation the OMRE has been in service about 85 percent of the total possible time. This performance is unusual for a new reactor type and is the direct result of the engineering simplicity and reliability described above. As of June 30, 1958, the OMRE has provided 4,200 hours of operational experience. This can be compared with 5,860 hours of operation on the EBWR (experimental boiling water reactor) during a calendar period about 3 times as long.

Concomitantly with the operation of the OMRE, design and analytical studies of full-scale plants of this type indicated that no significant problems would arise in increasing the core and plant size to 150 megawatts of electrical output. This extrapolation is in fact about the same as that used in going from EBWR to the Dresden plant of Commonwealth Edison, now under construction. The extrapolation from the Piqua OMR to the 150-megawatt plant is, of course, even less.

As a result of the above considerations, and the demonstration by the OMRE of the validity of the data on radiation stability of the terphenyls, the feasibility of the 150-megawatt OMR concept is established. In the light of our company's long experience in reactor technology, and the conservative approach which such experience creates, we confidently believe that the OMR now justifies firm price bidding on a guaranteed performance basis. You may recall that, even prior to OMRE operation, we were sufficiently sure of this reactor type to quote the Piqua plant to the AEC on a firm price basis—the only one of the second AEC demonstration round plants so quoted.

I hope the above brief comments adequately provide the broad technical grounds upon which we have based our request for inclusion of the OMR as an acceptable reactor type in the Euratom program.

Very truly yours,

NORTH AMERICAN AVIATION, INC.
C. STARR, *Vice President.*

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington, D. C., July 2, 1958.

DR. CHAUNCY STARR,
General Manager, Atomics International,
Canoga Park, Calif.

DEAR DR. STARR: In accordance with your request, I am pleased to clarify the application of the fuel element guaranties in the proposed agreement between the United States and Euratom to the organic moderated reactor.

Attachment A to the Memorandum of Understanding states in paragraph B 3 that:

"Fuel element guaranties may also be developed for proven types of reactors other than light water-cooled and moderated, determined by the Euratom Commission and the United States Commission to be eligible for consideration under the joint program."

The terms of the Memorandum of Understanding were further defined in an exchange of memorandums between Mr. Max Kohnstamm, on behalf of Euratom, and myself, copies of which you have. In my memorandum of June 12, 1958, I stated, on behalf of the Commission, that:

"As you know, the guaranties now specified in attachment A to the Memorandum of Understanding apply only to fuel elements meeting the specifications set forth therein, and considered acceptable for use in reactors of proven type. However, in this connection, the Atomic Energy Commission is prepared, at such time as sufficient technical information is available, to develop guaranties for fuel elements having specifications different from those given in the attachment which are to be used in reactors of proven type."

It is, then, clearly the intent of the Commission to develop appropriate guaranties for aluminum clad, uranium alloy elements for an organic moderated reactor, on the same basis as employed for the guaranties given in attachment A, if sufficient technical information is available.

In addition, the Commission considers the stainless steel clad, uranium oxide element meeting the specifications in attachment A is "acceptable for use" in the organic moderated reactor. We are, therefore, prepared to extend the guaranties for this type of element for the organic moderated reactor if this reactor is accepted for one or more of the projects under the joint program.

I hope the above clarifies the Commission's intent with respect to fuel element guaranties. I would, however, be happy to discuss this matter or other features of the proposed agreement, in greater detail, at your convenience.

Very truly yours,

R. W. COOK,
Deputy General Manager.

DECOMPOSITION RATES FOR POLYPHENYL REACTOR COOLANTS

This report briefly outlines the results obtained in the experimental program undertaken to determine polyphenyl decomposition rates, starting with the laboratory-scale capsule irradiations and terminating with the organic moderated reactor experiment (OMRE), now operating at the National Reactor Testing Station, Idaho. In addition, it will be shown that the polyphenyl coolant decomposition rates to be expected in a power reactor, such as the SENN reactor, are practical from an operating cost standpoint.

A. MECHANISM AND RATE STUDIES

Broadly speaking, the various radiation particles such as gamma photons, beta particles, neutrons, and alpha particles transfer energy to materials by interaction with either the electrons or the nuclei of atoms. Organic liquids are damaged by all particles or energy transfer processes which are more energetic than the dissociation bond energy (4 to 6 electron volts). Thus, in mixed in-pile radiation, it is only the thermal neutrons which do not contribute directly to organic liquid damage. Since radiation damage to organic compounds results from ionization; it is expected that all types of ionizing radiation will cause similar damage and that the extent of the damage will be nearly proportional to the amount of energy absorbed.

Gamma radiation interacts mainly by Compton scattering to produce electrons which are ionizing particles. Fast neutrons are slowed by scattering and, for

hydrocarbons, the energy released is transferred primarily to the hydrogen nuclei. This results in protons being formed which then cause ionization in much the same manner as the electrons from the gamma radiation.[1,2,3,4] In organic materials which are damaged by ionizing radiation, damage to the displaced atoms is masked by damage from ionization.[1]

Bopp and Sisman [1] in their studies on the effects of high-energy radiation on hydrocarbon plastics and elastomers report equivalent effects for electron and mixed in-pile radiation when change in several properties is used as an index of damage. Collins and Calkins [2] have irradiated a number of plastics and elastomers using both pure gamma exposures and mixed in-pile radiation. Their results indicate that the damage was proportional to the energy absorbed irrespective of the type of radiation. Various investigators have reached the conclusion that there exists a 1-to-1 relationship between energy deposition and bond cleavage for organic liquids and solids when the damage is caused by ionizing radiation.[1,2,3,4,5,6]

Radiation stability studies have been conducted on the polyphenyls under various conditions of radiation and temperature. Experiments include irradiations employing 1 Mev. electrons from a Van de Graaff generator conducted over the temperature range 75° to 770° F.; capsule exposure by mixed in-pile reactor radiation at ~80° F.; capsule irradiation by fast gamma photons at 850° F.; and 2 in-pile circulating loop tests carried out at elevated temperatures. The results of these various experiments are summarized in table I. (The decomposition rates, G_p, were calculated from an analysis of the high-boiler residue formed during each irradiation. The high-boiler residue is assumed to have a molecular weight of 460. A G_p value of 0.1 is equivalent to a decomposition rate of 38 pounds high-boiler residue formed per megawatt-hour of radiation energy absorbed.)

TABLE I.—*Summary of the decomposition rates for the polyphenyls*

Type of radiation	Composition	G_P molecules per 100 electron volts	Energy deposited by neutrons, percent of total
Electrons, 1 Mev.[7]	Ortho-, meta-, paraterphenyl at 660° F.	0.06–0.08	0
Electrons, 1 Mev.[9]	Orthoterphenyl at 750° F	.08	0
	Metaterphenyl at 750° F	.09	0
	Paraterphenyl at 750° F	.02	0
Electrons, 1 Mev.[10]	Paraterphenyl at 660° F	.06	0
	Santowax R at 660° F	.08	0
Mixed in-pile circulating loop, MTR, A–14[4]	Orthoterphenyl at 200° F	.05	5
Mixed in-pile capsule, BNL–E25[11]	Orthoterphenyl at 700° F	.07	30
Mixed in-pile circulating loop, MTR, A–13[12]	Santowax O–M at 630° F	.08	18
	Santowax R at 645° F		
	Diphenyl at 684° F		

The results obtained from the second inpile loop experiment [12] in the materials testing reactor are of particular interest, as this experiment provided operating conditions for the polyphenyls which were similar to those expected in a power reactor. Four fluids of different polyphenyl compositions were studied, i. e., diphenyl, isopropyl-diphenyl, and two mixtures of terphenyl insomers known as Santowax R and Santowax O–M. The decomposition rates observed during this experiment are presented in figure 1. The crosshatched band denotes the scatter in the results, which is less than the possible error in measuring radiation fluxes. The apparent decrease in the decomposition rate with increasing high-boiler residue concentration is the result of the lower concentration of the undamaged material.

An interesting phenomenon occurred during the last two cycles of the three-cycle diphenyl irradiation, which cannot be shown in figure 1 because the diphenyl concentration was held constant. During the latter cycles the high-boiler concentration was held constant at approximately 35 percent by removing irradiated material and adding fresh diphenyl to the loop. The decomposition rate, G_p, decreased with time to a value of 0.04 at the end of the test. Apparently, the radiation stability of the diphenyl improved as the result of changes in the breakdown mechanism.

For comparison, the preliminary results obtain from the OMRE are included in figure 1 (see also table II). There is excellent agreement between the inpile loop and OMRE results. During a recent run with the OMRE coolant at 600° F. the high-boiler residue concentration was held constant at 30 percent for 80 MWD. The initial and average G_p values are shown in table II. The decomposition rate appeared to decrease with irradiation as was noted above for the MTR irradiation of diphenyl.

The energy absorbed in the OMRE coolant as radiation is equivalent to 7.85 percent of the total reactor thermal energy production. The average decomposition rate observed during the OMRE run noted above was 51 pounds per megawatt-day of reactor operation. The equivalent G_p value may be calculated as

$$G_p = \frac{51}{(24)(.0785)(380)} = 0.071 \text{ molecules/100 ev}$$

TABLE II.—*OMRE coolant decomposition rate*

High-boiler residue weight percent:	G_p
12	0.13
12.5	.12
17	.11
21	.10
26	.095
30	.084
30 (average)	.071

B. COOLANT MAKEUP RATE FOR THE SENN REACTOR

The coolant makeup rate for the SENN reactor will depend on the energy absorption in the coolant and the applicable G_p value. The energy absorption rate for the SENN reactor is 3.95 percent. (It should be noted that the energy absorption rate for the SENN reactor (3.95 percent) is much lower than the energy absorption rate for the OMRE (7.85 percent) because the slightly enriched fuel of the former absorbs much more of the energy than the fully enriched fuel of the latter.) The SENN reactor is designed to operate with a high-boiler residue concentration of 30 percent. The G_p value expected for the above operating condition is 0.07 molecules/100 ev. The SENN reactor coolant makeup can be calculated as follows:

$$\text{Coolant makeup rate} = 0.07(380)\ (.0395)\ (24) = 25 \text{ pounds/MWD}$$

The cost contribution for coolant makeup is dependent on the coolant makeup rate, the unit coolant cost and the net thermal efficiency of the plant. If the unit coolant cost is $0.18 per pound and the net thermal efficiency is 27 percent, the resulting cost contribution can be calculated as follows:

$$\text{Coolant makeup cost} = \frac{25(0.18)}{24(0.27)} = 0.7 \text{ mill per net electrical kilowatt-hour}$$

The above cost is considered to be a conservative estimate. Several reasons for expecting the makeup cost to be less than the value obtained from the above calculation follow:

1. Operating experience with the OMRE has indicated that the decomposition rate, G_p, can be lowered by operating the reactor at concentrations of high-boiler residue up to 40 percent, and that such a change will not lower the thermal performance of the reactor.

2. The formation and buildup of compounds in the coolant, which tend to reduce the decomposition rate, are expected from the results observed during the 3-cycle diphenyl irradiation in the MTR loop and during the OMRE run at a high-boiler residue concentration of 30 percent.

3. The cost of the coolant feed material is expected to be somewhat lower for the SENN reactor, because it is possible to use a mixture of diphenyl and terphenyl instead of pure terphenyl. In addition, manufacture of the feed material in Italy, as anticipated, will allow lower costs.

4. It appears possible to reform the high-boiler residue to diphenyl and terphenyl by the addition of hydrogen. Laboratory investigations will be performed in the near future to determine the feasibility of this process.

Therefore, the cost of coolant makeup presented above should be considered as a conservative estimate, which will undoubtedly be lower in the near future.

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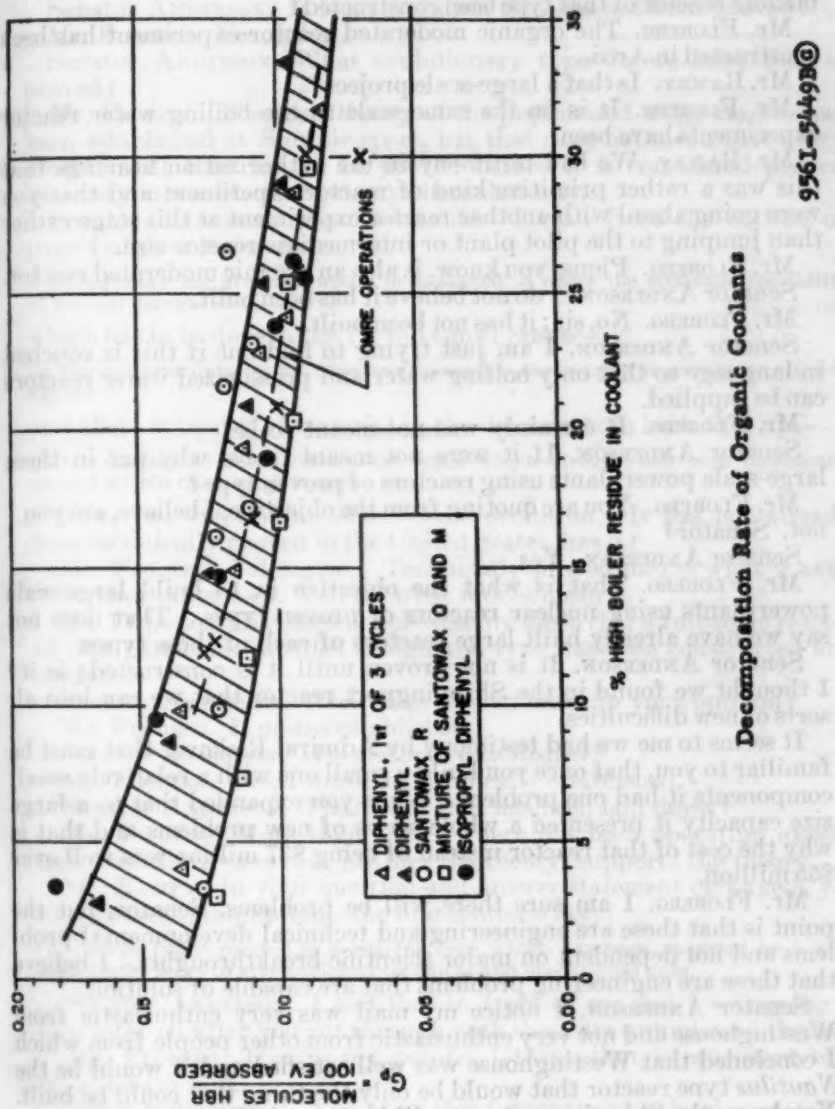
Decomposition Rate of Organic Coolants
9561-5449B©
% HIGH BOILER RESIDUE IN COOLANT
OMRE OPERATIONS
△ DIPHENYL, 1st OF 3 CYCLES
▲ DIPHENYL
○ SANTOWAX R
□ MIXTURE OF SANTOWAX O AND M
● ISOPROPYL DIPHENYL
G_p = MOLECULES HBR / 100 EV ABSORBED
0.20
0.15
0.10
0.05
0.00
0
5
10
15
20
25
30
35

Mr. FLOBERG. My point, Senator, is this: The Commission view is that we now have a sufficient background of experience with the organic moderated reactor to suggest to Euratom that it, too, falls within this definition.

Senator ANDERSON. Where has a large-scale powerplant using the nuclear reactor of that type been constructed?

Mr. FLOBERG. The organic moderated reactor experiment has been constructed in Arco.

Mr. RAMEY. Is that a large-scale project?

Mr. FLOBERG. It is on the same scale as the boiling water reactor experiments have been.

Mr. RAMEY. We had testimony in the authorization hearings that this was a rather primitive kind of reactor experiment and that you were going ahead with another reactor experiment at this stage rather than jumping to the pilot plant or intermediate reactor size.

Mr. FLOBERG. Piqua, you know, is also an organic moderated reactor.

Senator ANDERSON. I do not believe it has been built.

Mr. FLOBERG. No, sir; it has not been built.

Senator ANDERSON. I am just trying to find out if this is couched in language so that only boiling water and pressurized water reactors can be supplied.

Mr. FLOBERG. It certainly was not meant to be.

Senator ANDERSON. If it were not meant to be, why put in these large-scale powerplants using reactors of proven type?

Mr. FLOBERG. You are quoting from the objective, I believe, are you not, Senator?

Senator ANDERSON. Yes.

Mr. FLOBERG. That is what the objective is, to build large-scale powerplants using nuclear reactors of proven types. That does not say we have already built large reactors of each of these types.

Senator ANDERSON. It is not proven until it is constructed; is it? I thought we found in the Shippingport reactor that we ran into all sorts of new difficulties.

It seems to me we had testimony by Admiral Rickover that must be familiar to you, that once you build a small one with a relatively small components it had one problem. When you expanded that to a large size capacity it presented a whole series of new problems and that is why the cost of that reactor instead of being $37 million was well over $55 million.

Mr. FLOBERG. I am sure there will be problems, Senator, but the point is that these are engineering and technical developmental problems and not dependent on major scientific breakthroughts. I believe that these are engineering problems that are capable of solution.

Senator ANDERSON. I notice my mail was very enthusiastic from Westinghouse and not very enthusiastic from other people from which I concluded that Westinghouse was well satisfied and it would be the *Nautilus* type reactor that would be only the thing that could be built. You know the Shippingport cost will be around $60 million.

The British have some gas-cooled reactors they are going to supply to this community, I assume, that have a unit cost of a fraction of that, a fourth or fifth of it.

Which reactor will look the best after they get built under the circumstances?

Mr. FLOBERG. I am sure that any reactor that is built will not be a duplicate of the Shippingport reactor.

Senator ANDERSON. What would it be?

Mr. FLOBERG. It would be an evolution of that, obviously. I believe the Yankee type reactor——

Senator ANDERSON. It is an evolution that has not been proved?

Mr. FLOBERG. Yes; it has.

Senator ANDERSON. What evolutionary type do we have that is proved?

Mr. FLOBERG. The basic theory of the pressurized water reactor has been established at Shippingport, but that does not mean that every evolution of that has to be proven before it is considered proven because you would never get anywhere that way.

Senator ANDERSON. Wait a minute. I read from the bottom of page 4 of your statement:

> Lastly since the program would be designed to prove the economic feasibility of nuclear power—

which has to be done in the 12- to 14-mill range—

> in Europe and develop an industrial complex necessary for expansion, it was agreed—

and there is plenty of material in the documents to back that up—

> that it should be based on reactor types which already had been technically proved within the United States.

Now, you are talking about some evolution. It has not already been technically proved in the United States, has it?

Mr. FLOBERG. I disagree. Technically proved means what it says.

Senator ANDERSON. Tell me what it does mean?

Mr. FLOBERG. That does not necessarily mean that a full-scale reactor of this particular detailed design and type has been constructed and operated.

Senator ANDERSON. What does proven mean in your opinion?

Mr. FLOBERG. It means established.

Senator ANDERSON. Has one been established?

Mr. FLOBERG. Yes, I think so, technically established.

Senator ANDERSON. The theory that has been laid down?

Mr. FLOBERG. More than that. There has been operating experience with hardware that justifies the theory, supports the theory.

Mr. RAMEY. In your question-and-answer statement on page 5, you also go into this question—the first sentence says:

> "Proven type" reactor is a reactor type which has been operated on a scale sufficiently large to give sufficient technical and operational data.

Senator ANDERSON. I had that in front of me and I was going to that later on after you got through with these drawningboard theories.

Mr. FLOBERG. That is my point. I think that is consistent with what I have said.

Senator ANDERSON. You mean this future type has been operated on a scale sufficiently large to give sufficiently technical operational data?

Mr. FLOBERG. Not operated. What I am saying is that the operation of the type of reactor has been on a sufficient scale so that future models of it can be looked to with confidence.

Senator ANDERSON. May we read your two things together and find out if it ties it down to the *Nautilus* Shippingport type of reactor.

You are talking about large scale reactors of proven types, technically proved and so forth. In the question and answer statement you say :

Proven reactor—

you define it yourself—

is a reactor type which has been operated on a scale sufficiently large to give significant technical and operational data.

Will you tell me, then, or will you supply for the record, what types have been operated on a scale sufficiently large to give sufficiently technical and operational data and are technically proved within the United States?

Mr. FLOBERG. Yes, sir; I can tell you right now.

I consider the boiling water type, the pressurized water type, and organic moderated type to answer this description.

Senator ANDERSON. Where has one of the organic moderated types been built?

Mr. FLOBERG. In Arco.

Mr. RAMEY. That again is a reactor experiment that does not have any power takeoff?

Mr. FLOBERG. That is correct.

Senator ANDERSON. What is the mill-per-kilowatt cost developed? Ten cents a kilowatt?

Do you think that is economically feasible?

Mr. FLOBERG. Yes, sir; I do.

Senator ANDERSON. You think 10 cents is a good economic price in Europe?

Mr. FLOBERG. No, sir.

Senator ANDERSON. That is what this has done.

Can you give me another figure for its cost?

Mr. FLOBERG. What reactor are you talking about?

Senator ANDERSON. At Arco, the one you are talking about. What is its cost?

Mr. FLOBERG. I will have to put that in the record. I cannot give you that right now.

Senator ANDERSON. Mr. Cook knows, or somebody knows. You have a staff with you.

Mr. DAVIS. Senator, that reactor does not have any power takeoff as you know.

Senator ANDERSON. It has developed what, 5,000 kilowatts?

Mr. DAVIS. I believe it has run up to about 14,000 thermal kilowatts.

Senator ANDERSON. What is that reduced down to kilowatts of ordinary electrical power? What does that come down to, Mr. Davis?

Mr. DAVIS. We have never made such a figure because it is not pertinent in that particular experiment.

The reason that experiment was built was to find out whether the organic coolant would stand up under the irradiation. If it does, you know that you can use——

Senator ANDERSON. What do you mean, if it does? Is that not a proven type?

Mr. DAVIS. This, so far, has shown it stands up every bit as well as we thought it would.

The point here is simply that if this is——

Senator ANDERSON. This is proven now—this is not "iffies" and "anys."

Mr. DAVIS. It has been running several months. By the time one will be talking about actually constructing one it will have run a great deal longer.

Senator ANDERSON. You mean you are going to construct it before you run it long enough to test it?

Mr. DAVIS. No, sir. Construction will not start for some time. The organic material itself permits you to use conventional materials of construction, conventional components that you can go out and buy directly.

So that the point in doing this experiment was to show that you had a material which would allow the use of conventional materials and conventional components.

This reactor does not need to be demonstrated on a large scale to prove out this organic, the stability of the organics or the freedom from fouling.

Senator ANDERSON. Then it is your statement that this is a reactor type which has already been technically proved within the United States?

Mr. RAMEY. On a large scale?

Mr. DAVIS. It does not say on a large scale.

Senator ANDERSON. Let us stay with the testimony. Just stay with his words in the testimony—

should be based on reactor types which already have been technically proven within the United States.

Would you state for the record that you regard the Arco experiment as a reactor type which has been technically proved within the United States?

Mr. DAVIS. My statement would be that the operation of the organic moderated reactor experiment at Idaho has demonstrated the satisfactory stability of the organic material and it has shown that the surfaces of the heat exchangers and the fuel elements do not foul.

These are the purposes for which it was built and the operation to date confirms the expectations in that regard.

Senator ANDERSON. I would think we would both agree that is a few more words than Mr. Floberg had in his testimony that I asked about.

The statement was that the reactor type is one that is technically proved in the United States. It is still in the process of being proved; is it not?

Mr. DAVIS. Such a reactor, and this includes pressurized-water reactor, is always in a stage of development and will be in the years to come.

Senator ANDERSON. Is it your testimony that this is in the same stage as the pressurized-water reactor?

Mr. DAVIS. In some respects, I believe it is. In other respects, it is not.

Senator ANDERSON. In some respects, the Washington Senators are like the Yankees; they play with nine men.

Mr. HOLIFIELD. They both play at full strength.

Senator PASTORE. This reactor at Arco is not a full-scale reactor, is it?

Mr. FLOBERG. No, sir.

Senator PASTORE. You are saying today that it might well be for the research and development of this program, that, if we take a prototype or a small-scale reactor that has shown technical stability and establishment in the United States, it might be well for us to venture in Europe and Euratom with a full-scale reactor? Are you saying that?

Mr. FLOBERG. I would like to point out, Senator, that the only real problem of the organic-moderated reactor was the question of the stability of the organic.

Senator PASTORE. I am leading to another point. You see, I hope that someday we will get off this merry-go-round on this whole field of research and development for the production of electric power through the use of atomic energy.

The reason for my saying this, and this is not criticism of you, Mr. Floberg, because I am very much delighted in the things that you are saying here this morning, we of the committee tried to say the same things in April of 1956 when Mr. Gore introduced a bill requiring the authorization of $450 million in order to get on our way with the program.

And, had we undergone that kind of program at that time, I think we would be a lot better off today. We are going to do in Euratom what we have resisted in this country because the Commission has always taken the position that it was unwise to get in the full-scale reactors; it was wiser to invest money in basic research and development in order to prove prototypes.

Now, we are just reversing ourselves, in a way, and I am glad to hear that we are, because we are beginning to venture under Euratom what we have never been able to venture here under our own domestic program.

I say this; that, if we have achieved a success at Arco, we ought to try it on a large-scale reactor, whether it is in the United States or whether it is in Euratom.

I am glad to hear this kind of testimony this morning, because that has never been the position of the Commission.

In 1956, the Commission resisted the Gore bill because they said we were not ready for it.

What we were not ready for in 1956 in the United States of America, it seems to me, today, that we are ready for under our arrangements with Euratom, and I am glad to hear it.

Chairman DURHAM. Are there any further questions?

Mr. RAMEY. I think the purport of these questions on the organic moderator is not that it does not show technical feasibility and that it ought to be construed, but that you may be establishing a standard here that it cannot meet. Literally, you are talking about a large-scale reactor of proven experience, and then the fine print says, "But we are going to go ahead and consider an organic-moderated reactor."

Possibly, the actual agreement of cooperation, or the supporting memorandum of understanding, or your testimony, ought to be corrected to indicate the exact status of it.

Mr. FLOBERG. We don't want to have any fine print at all here. We want this out where everybody can see it. I would like to make it clear that, once again, this is not a decision of the Commission as to what reactor will be built in any particular place. First of all, a utility will make that decision in its own individual case.

Senator ANDERSON. Will you repeat that again; the utility will make the decision? I thought it had to be a mutual agreement.

Mr. FLOBERG. It will be mutual.

Senator ANDERSON. Then it does not make a decision. It is a partner in the decision?

Mr. FLOBERG. That is correct. Several people have to go through the decision-making process, Senator, before we come up with a finished determination.

Senator ANDERSON. I did not want to show that the utility made the decision, because it is not correct.

Mr. FLOBERG. There is no unilateral decision that will be made by anybody. But the utility that will construct the reactor is one party to the decision; Euratom is a party to the decision; and the United States Atomic Energy Commission is a party to the decision.

The United States Atomic Energy Commission also reports to the Joint Committee. So, this decision is not a frivolous one, in any case, and there are a good many checks on it, I say.

Senator PASTORE. Your target is 1 million kilowatts by 1963?

Mr. FLOBERG. That is correct.

Senator PASTORE. Now, does that, in short division, mean six reactors?

Mr. FLOBERG. By short division, you come out to approximately six reactors.

Senator PASTORE. The short division does not come out with the fact that you have six nations in Euratom?

Mr. FLOBERG. No.

Senator PASTORE. We are not fixing this up, for political reasons, so that each one gets one?

Mr. FLOBERG. No; in fact the six-reactor figure was a later developed figure.

Senator PASTORE. This is predicated on the technology involved, rather than the fact that you have 6 nations and, in order to accommodate them all, you are planning 1 for each?

Mr. FLOBERG. The target was stated as approximately 1 million kilowatts.

Senator ANDERSON. Was not that target based on the fact that there were 6 nations and each one wanted 150,000 kilowatts? How did you get the target, if you did not get it that way? There is something under the Christmas tree for everybody.

Mr. FLOBERG. No, Senator; I doubt that.

Senator ANDERSON. Sure, there is. That is the way you got the target. These people over in Europe did not develop the target of 1 million kilowatts?

Mr. FLOBERG. I am willing to make a little side bet, Senator, that Luxembourg will not build one.

Senator ANDERSON. You would not want to take advantage of me down the street, would you. You must have inside information. That is why you say 5 or 6?

Representative HOLIFIELD. I move that the record be corrected and the word "down" be stricken.

Senator ANDERSON. I am willing to get out of the room and make a small bet that, if 5 are constructed, 1 of the 5 will land in each of the 5 countries outside of Luxembourg.

Mr. FLOBERG. You are changing my bet.

Senator PASTORE. That brings me down to the questioning of Mr. Holifield yesterday. I think he was a little disturbed over the fact that you were venturing on 6 and he was talking about 2 or 3. Did you not raise that point?

Representative HOLIFIELD. I did not get your first comment just now. What did you say?

Senator PASTORE. On this very point of the 6, I think you raised the point yesterday that, possibly, it would not be wise for us at this juncture to agree to 6; that, possibly, it ought to be cut down to proven types of less than 6; the point I am getting at for Mr. Floberg is: Where would that place us with relation to our negotiations with Euratom, if you took the position you suggested?

I think we want that covered at some point.

Representative HOLIFIELD. I regret I am late in arriving, I had to appear before the Rules Committee this morning, so I am not aware of the questioning that has gone before.

But two things that concern me were the interpretation of the proven types and I understand there has been some discussion on that.

I think that there should be some language inserted there which would be types that are deemed mutually feasible from a technological standpoint by the participants in the program.

I am not suggesting the exact words, but the thought should be left flexible there.

Mr. FLOBERG. I believe it is, Mr. Holifield. Certainly the intention is to have it so and I believe it is.

Representative HOLIFIELD. If it is not, I would like to see that language changed.

But the other point which Senator Pastore brought up was my thinking that to start six reactors, regardless of type, in 1959, let us say, and in the 4 year construction in 1963, that if you started more than one of any one type you would necessarily arrive at practically the same technological result.

In other words, let us say three boiling water reactors started in 1959 would end up in 1963 being very close together and you would not be able to take advantage of any technological advances in the meantime in a progressive step of the same type of reactor.

This was my thinking on the 6, not 6 different types, but the status being the same.

Mr. FLOBERG. I would like to take that question right now, if I may.

What you are saying is that you think the target is overly ambitious because it must be apparent that unless you do start 5 or 6 you will not achieve the 1 million kilowatts by 1963?

Representative HOLIFIELD. That is right.

Now, the point is: Is it most important to achieve the 1 million kilowatts, or is it most important from our standpoint, certainly from our standpoint, to achieve a progressive increase in technological advancement?

Mr. FLOBERG. I will try to take that part of the question now.

It is true that the closer reactors of the same type are built in time the more similar they will be.

On the other hand, it is also true that being successive, there will be necessary product improvement in them the same as there is in aircraft types.

Representative HOLIFIELD. But they are not successive.

Mr. FLOBERG. They will be successive by some period of months.

Representative HOLIFIELD. They will be successive over what has gone before in the United States, but they will not be successive so far as this period of 4 years is concerned.

Mr. FLOBERG. They won't be twins exactly simultaneously. There will be a period of months in between.

Representative HOLIFIELD. If you wish to finish them in 1963, you have to start them in 1959?

Mr. FLOBERG. I agree with that. You still have some finite period of time between the manufacture of one component and the manufacture of another component in the reactor. There will be some product improvement.

You are right; it won't be much because you cannot squeeze much improvement in the time scale we are talking of here.

On the other hand, I believe this program will be a check and double-check of reactor experience and reactor types that is not an unrealistic or unreasonable one.

I think this is a sound and good portion of experience on which to predicate this program.

Senator PASTORE. The important question is: Whose money is it anyway? Who is building the reactors? It is their money. What are we getting excited about if they build 3 or 6 of them if they are going to build them with their money?

It is true we loan the money to some extent, $135 million of it, but they have to pay it back. They are putting up $215 million of their own.

If the Euratom is willing to invest in the future of atomic energy for the generating of power, I think myself they ought to be more concerned with this point than we should be.

We are losing sight of the fact that this is a decision that is up to them to make, in essence.

Senator ANDERSON. I hope we do not get too far out that we are going to lend them $135 million to an organization that does not even have an office desk, does not have a dollar's worth of assets.

It proceeds to give this immediately to the utilities of that country, and we expect to recover from the paper organization of Euratom, which never will have a dollar's worth of assets, $135 million?

Mr. FLOBERG. They have quite a bit of assets. They have a couple hundred million dollars of assets right now.

Senator ANDERSON. They do?

Mr. FLOBERG. Euratom has; yes, sir.

Senator ANDERSON. $200 million right now?

Mr. FLOBERG. Yes, sir.

Senator ANDERSON. I question that statement. I think you ought to check it up and supply it for the record as to what Euratom has right now.

Mr. FLOBERG. I will be glad to certify it and supply it for the record.

Representative HOLIFIELD. I do not want to seem to be in conflict with what Senator Pastore has said, but it seems to me that our interest lies in the contribution which we make which, as I figured the other day, will run up better than $200 million in terms of fuel inventory loaned to them, and which may or may not be eventually paid back—we hope that it will be—and with the $50 million for research and development we have a very obvious financial stake and they are not paying for everything.

They are paying for their part of it and I hope they pay for as much as they contract to pay for, but we still have a contribution of taxpayers' money in this venture.

Senator PASTORE. I do not want any misunderstanding on this. I think, myself, that you can take any phase of this and dramatize it until the cows come home. Essentially, as I understand the agreement for the basic building of the reactors, they are borrowing certain money from the Export Bank, $135 million, which they will have to pay back.

They are putting out for capital outlays themselves $215 million.

Am I correct on that?

Mr. FLOBERG. That is correct.

Senator PASTORE. Now, it is true that we put up $50 million and they put up $50 million over a period of 5 years for basic research with an option to renew it for another 5 years. Am I right so far?

Mr. FLOBERG. Yes.

Senator PASTORE. It is true, too, that uranium we provide as the initial inventory they will pay us back under an installment plan.

But the point I am making here is that what we are debating now is not the uranium that will be burned in these reactors, we are not quarreling with that, because, after all, if they produce power at any cost they are in a better position to pay us back than if they do not produce power.

But the important point I am making here that basically we are talking about building X number of reactors. The only point I want to make for the record is that insofar as the reactors themselves are concerned, I realize there are other related things where we have the responsibility and where the taxpayers of this country are going to put up some of the money.

I hope we will get some advantages from it, too, but the fact of the matter that I am making here is that for the building of the reactors themselves the record must be clear that this is their money. It is either money that they themselves put up or money they borrow and have to pay back. Am I right?

Mr. FLOBERG. That is correct. That is a correct statement.

Senator PASTORE. I want the record to show that.

So if they build 60 of them and they blow up, it is money that they have invested and lost.

Senator ANDERSON. I do hope you will supply that information on the $200 million in assets, Mr. Floberg, because I would like to go back and question you some more.

(The information referred to follows:)

NOTE PREPARED BY STATE DEPARTMENT, JULY 3, 1958, ON THE EUROPEAN SOURCES OF FINANCING FOR THE EURATOM-UNITED STATES PROGRAM

(1) Assuming a total cost of $350 million, we can say that the electricity companies will normally be able to contribute, out of their own sources or otherwise, around $150 million, that is the cost of conventional powerplants with the same capacity. The loan to come from the United States Government being estimated at $135 million, there remains a gap of $65 million to be found from other sources.

(2) It seems that this gap of $65 million can be closed by the following sources:

(*a*) The European Investment Bank has expressed a general interest for the program and has officially informed Euratom that is is prepared to envisage—

a contribution out of its own funds, in relation with its relatively limited possibilities,

a role of leadership to find other sources of capital.

(*b*) In Germany, the Government is decided to make a special effort to facilitate the completion of a United States-type nuclear powerplant. The granting of a long-term loan with very low rate of interest is contemplated by the German authorities.

(*c*) In Italy, a new law is under preparation in order to grant an annual subsidy during 15 years for all nuclear powerplants. This subsidy could probably be capitalized by a state-controlled financial institution and provide the equivalent of 20 percent of the capital cost.

(*d*) In France, it seems probable that the Government is willing to make a special effort to facilitate the solution of the complementary financial requirements for 1 or 2 new nuclear powerplants, to be built under the Euratom-United States program.

(*e*) In Belgium, the Government will probably be favorable to the granting of subsidies in order to reduce the rate of interest on loans to come from the two long-term investment institutions for the financing of nuclear reactors under the Euratom-United States program.

(*f*) In the Netherlands, the situation of the capital market has greatly improved since last year, and it seems now possible for Dutch enterprises to raise some loans on their capital market, up to reasonable amounts.

It is likely that the Dutch electricity companies will be in a position to find the financing required for the nuclear reactor, on top of what will come from the United States loan.

I could not agree with it. I do not think that you have the same obligations on the $135 million as will be involved in the investment of these funds.

I understand that certain utilities over there are going to have to try to raise part of the money and they are not going to put their money in on a nebulous program. They have stockholders.

I am not objecting to what Senator Pastore has described. I think we ought to make some money available. I am glad we are going to do so, but I would like to have you submit your record and then try to develop from that whether we regard it within the bounds of what might be regarded as prudent loaning.

The Export-Import Bank may get its money back, but I do not think it has any place to call for the money if it does not get its money back.

This question of improvements that you are talking about I think should be read in connection with the President's letter of the 23d of June 1958, in which he submitted this to the Congress. He said:

It is, therefore, gratifying that the research, development, testing and construction program in the United States has progressed to the point that United States reactors of proven types are available and will be selected for commercial exploitation in the joint program of large scale nuclear reactors.

My question was: Which ones are available?

Mr. FLOBERG. Are you reading from the top of page 12, Senator?

Senator ANDERSON. Yes, I am. Which ones are available?

Mr. FLOBERG. I assume that the President is referring there to the PWR, the BWR, and the OMR.

Chairman DURHAM. Are there any further questions on this section?

We have a long document here.

Representative HOLIFIELD. I do not know what the total obligation of the United States is under this program and I do not believe anyone knows, but the statute itself—there are two items, one $50 million for a program of research and development.

Senator ANDERSON. In the first 5 years.

Representative HOLIFIELD. Yes. We do not know how much more it will be later. But we assume it will be worthwhile because we will get the benefits of it and I am not opposing it.

In section 4 you have $90 million which, as I look at it, is a complete subsidy of taxpayers' money for the purpose of guaranteeing fuel life, reprocessing, fabricating and so forth.

Mr. FLOBERG. That is a contingent liability.

Senator ANDERSON. It is not limited in my opinion to $90 million because if we get into the program and we utilize the $90 million, Congress will undoubtedly be asked for an additional amount.

So as far as I can see now it is $90 million but there may be a contingent liability greater than that.

Mr. FLOBERG. No, we regard that as a ceiling figure, Mr. Holifield. There is certainly no contemplation it will ever exceed that.

My own opinion is that it will be half that.

Senator ANDERSON. Therefore, you would not mind if we write in the bill not to exceed $90 million?

Representative HOLIFIELD. Even if we wrote it in, I would submit that if the $90 million were used up and the period of 20 years of the agreement had not been accomplished, I submit we would still probably be asked for some additional money to do it. But I do not care to go into that. That is speculation on my part. But how did you arrive at the figure of $90 million?

Mr. FLOBERG. That is a figure calculated on the basis of the currently available manufacturers' guarantees compared with the guarantees proposed in the part of the statement I will come to later, and on the basis of considerable refining of figures this was considered to be a ceiling figure.

I am perfectly willing to have you put that as a ceiling. You are a better prophet than I am as to what will happen in the future.

Senator PASTORE. It comes back to the basic argument I made at the time of the Gore bill. How will you ever know the fuel life of these rods unless you put them in the reactor and burn them?

Mr. FLOBERG. The more experience you get, the more you know.

Senator PASTORE. For that argument you have to build full-scale reactors before you will ever find out where we are.

Chairman DURHAM. Are there any further questions, Mr. Holified?

Representative HOLIFIELD. No; execpt I would like to add to the $50 and the $90 million and the $100 million inventory we have to charge.

Chairman DURHAM. You may proceed.

Mr. FLOBERG. Yes, sir.

As a second major objective it was concluded that it would be necessary to establish immediately a companion research and development program centered on these types of reactors. This program would be aimed primarily at the improvement in performance of these reactors and at lowering fuel cycle costs. Experience has shown that major gains can be made in improving the performance and in lowering the operating costs of large reactors if there is an associated research and development program. Even in instances where reactors are built in a single "generation" it was noted that certain improvements can be made in the design of the reactors, major components, and auxiliary equipment for incorporation in successive units. A strong research and development program can lead to substantial improvements in power levels and savings in the fuel cycle with a resultant lowering unit power costs.

The value of such a program has been demonstrated repeatedly in the United States. The establishment of such an activity also would tend to provide an important further assurance to industry that costs will decrease with time and experience. The research and development program that is being proposed, accordingly, is to be established for a 10-year period. During the first 5 years the financial contribution of the community and the United States is to amount to about $50 million each. Prior to the completion of this initial period the United States and Euratom will determine the financial requirements for the second 5-year period. The European Atomic Energy Community is enthusiastic about this phase of the program and has earmarked from available fund $50 million for the initial 5-year period. Section 3 of the proposed Euratom Cooperation Act which has been submitted to you will provide the Commission with the authority it needs to carry out its part of the research and development program.

Chairman DURHAM. Any further question on this paragraph?

If not, we will proceed to C.

INCENTIVES REQUIRED

Mr. FLOBERG. In the course of formulating the program we and our associates in Euratom, of course, realized that the maximum support of the industries in the community and the United States would have to be obtained if the desired objectives were to be achieved on schedule. As has been the case with other industries where the initial development has required high investment it was concluded that the program would not move ahead at the desired pace unless some special incentives were made available.

The major problem that faces Europe in its effort to install a substantial amount of nuclear power rapidly is the need to reconcile this objective, which clearly is in the common interest, with the realities confronting the individual electricity supplier who faces commercial risks in entering this comparatively new field. Although the European utilities are willing to pay an initial premium for nuclear power they are prepared to do so only to a point and then only if they have some conventional power. In formulating the program it was agreed, accordingly, that the major uncertainties should be minimized and the terms be made sufficiently attractive to provide reasonable assurance that an adequate number of utilities would be encouraged to enter the program. It was recognized that the terms developed should foster and not interfere with the normal commercial relationships.

After much discussion of various possible approaches to the problem—see appendix A—it was concluded that the most desirable approach would be one under which the utilities would accept the risks for the total capital, operating and maintenance costs, and for those associated with reactor on-stream time. The United States, in turn, would make U–235 available on a lease or other favorable basis, would assist in capital financing, would provide a long-term market for the purchase of plutonium at its fuel value price, and would provide fuel element processing services under the same conditions offered to domestic reactor operators in this country.

Most importantly the United States would guarantee fuel fabrication costs and fuel life. In our study of what was required to make the program go we concluded that fuel cycle costs represent the major unknown in nuclear power economics today due to uncertainties now associated with fuel element life and fabrication costs. We agreed that it would be essential to minimize the economic risks now associated with these uncertainties if the desired participation by the European utilities was to be reasonably assured.

Actually, that is a preamble to what is going to follow in the next section.

Chairman DURHAM. Are there any questions on this section?

If not, we will proceed to "Fuel cycle guaranties."

FUEL CYCLE GUARANTIES

Mr. FLOBERG. The proposed program now before you, accordingly provides that the United States Atomic Energy Commission, for a 10-year period of operation, would guarantee ceiling costs for the fabrication of the fuel elements required under the program, as well as a fixed minimum life for these elements. These guaranties would be of a battery type under which the costs both for fabricating the replacement elements and for processing the spent elements would be made proportionately lower if the fuel life guaranty were not met. They would be offered only to the extent that equivalent or better guaranties were not available commercially and are designed to assure that actual charges to an operator of a reactor constructed under the joint program for fabricating, processing, and transporting fuel would be no greater than would result if the manufacturer met the guaranties established by the Commission.

Senator ANDERSON. Could you explain that last sentence?

Mr. FLOBERG. Yes. That means, if and when the fuel exceeds the guaranteed performance levels and corresponding rebates take place, the Commission would not get back more money than it had put in. We would not make a profit on the guaranty in other words.

Senator PASTORE. Give us an example.

Mr. FLOBERG. The fuel life is guaranteed for 10,000 units of operation and it actually performs 11,000 units so there is a rebate on the performance of the fuel——

Senator PASTORE. Rebate by whom to whom?

Mr. FLOBERG. By the customers of the manufacturer of the fuel element.

The fuel has progressed to the point of evolution where it is exceeding the guaranties that have been sponsored by the Commission. When it reaches that point the understanding is that there will be a payback

to the Commission to compensate it for the guaranties it has supported during the period when the fuel was not living up to its guaranteed performance, but this sentence means that such a recovery of funds during the period when the fuel exceeds guaranteed performance level would not in any case exceed the amount that had been furnished by the Commission to support the guaranties.

Senator ANDERSON. I did not understand that at all.

Now, let me see if I do have it right: We are going to guarantee 10 years of performance?

Mr. FLOBERG. No; make it 10,000 megawatt days per ton performance.

Senator ANDERSON. I have to get something I can understand. We are going to guarantee 10 years' performance.

They run 6; therefore, we would have to make up four-tenths of that cost because of the failure of the guaranty.

But after we replace the unit at the end of 6 years, they proceed to run the full 20 years, we would get a rebate back then, but it could not exceed what we had paid out because of the shortness of the first round?

Mr. FLOBERG. Accepting your figure, or your facts——

Senator ANDERSON. I am willing to concede that is not the way to put it. I am only trying to find out if that is the purpose of it.

Mr. FLOBERG. That is correct.

Senator PASTORE. Let us assume that they build a reactor in France when the fuel does not live up to the guaranty for a period of 2 years and then we build another reactor in Italy where the fuel life exceeded the guaranty. Would there be an edging off there, or must this be confined to the same reactor during an evolution of improvement?

Mr. FLOBERG. It would have to be on a project-by-project basis, Senator.

Senator PASTORE. Well, we are doing business with Euratom. After all, we are doing business with an entity that includes all six nations. Does that not place us at a disadvantage in that respect?

Mr. FLOBERG. I do not think so, Senator, because the reactors will be individual.

Senator PASTORE. And may have a different manufacturer?

Mr. FLOBERG. Different manufacturer may have different design features, and so forth.

Senator PASTORE. I am thinking now of the position of the United States. Our guaranty runs to the Euratom, it does not run to the individual supplier.

We are indemnifying Euratom.

The point is this: When they lose we may gain.

On the other hand, why cannot this be done as a package deal?

Mr. FLOBERG. We have an overall agreement with Euratom, but the individual arrangements in each case will be for the individual case.

This overall arrangement with Euratom is in fact an enabling contract.

Chairman DURHAM. It looks like it is getting rather complicated.

Senator ANDERSON. I think Senator Pastore has an extremely good point. If you are going to make a general guaranty to Euratom and the one falls down and the next one overperforms, you should not be told, "Now, we have to handle this on a project-by-project basis."

Senator PASTORE. You see, you may have one instance where you may overshoot your mark without ever having had to pay out because of failure to live up to the guaranty and yet in that instance either the particular nation or the supplier would get the advantage and we would not be paid back at all for other instances where we would have to make up the deficiency.

Mr. FLOBERG. I think it would come out in the wash, Senator.

Senator PASTORE. That is what I am asking you, but you said "No."

Mr. FLOBERG. In the case of the overperformance, say, our guaranty would be, in effect, dissolved because the fuel elements would have performed up to the guaranteed level.

Senator PASTORE. That is right. Therefore, even though you have something over and above expectations you have no rebate because there has been no loss.

Whereas, you might have in another country a failure which might call for a large contribution on the part of the American taxpayer, yet there is no edging off where your performance has been good.

I think, myself, this ought to be a blanket agreement where we ought to have a pool, you see, and where no one would take advantage of the fact that they were given the better kind of a proven reactor.

Mr. FLOBERG. Could I ask Dr. Pittman to respond to your question?

Senator PASTORE. Yes.

Dr. PITTMAN. The problem we would run into if we did it this way would be that the utility that was operating a good reactor would have no incentive to get the most possible out of his reactor because he would know that if he got more than the guaranty he might have to pay it right back in against poorer operation of some other utilities plant.

It would mean that we would not be in a position to get the maximum benefits out of one or more of the projects.

I think one of the things we have to keep in mind here is that there has to be an incentive for the operator himself to push these fuel elements to the maximum extent possible.

The only way he can have that incentive is for him to realize that if he does get better operation out of his fuel he will share in the resulting benefits.

If we took those benefits away from him because of somebody else's failure there would be a very difficult problem.

Chairman DURHAM. Why do you have to administer that? You take an instance of a private corporation in America that has 25 plants, all of them do not produce alike. He charges it to the overall plant. He has a master plan.

Instead of that you are going to deal with the individual utility in each country.

Dr. PITTMAN. Each one of these reactors will be owned and operated by an individual utility in the European complex. They are not operating as a joint group of 6 or 8 companies under Euratom. They are actually operating as separate units.

The electricity is fed into the separate grids. If you penalize one company who, through carefully operating a good reactor is getting good results because of another reactor having failed, I think you would do away with some of the major benefits of good operation you might get, and would expect to get, out of this type of individual project-by-project approach.

Chairman DURHAM. Yes; but you get yourself down to a country-by-country level of negotiations which is going to take a lot of time.

It looks to me as though since these countries have established this Euratom, their government bodies have O. K.'d it, you deal directly with that body and let them deal with that trouble.

Dr. PITTMAN. The guaranty, sir, is going to the utility company who is operating the reactor. We are carrying the guaranties to the utility, through the American manufacturer, that is true; but the thing you have to do to get the private or public utility in Europe to put his money into this is to know that he, himself, has a guaranteed ceiling on the cost of the electricity out of that plant.

Chairman DURHAM. That is their job, not ours, as I see it. I may be wrong.

Dr. PITTMAN. It would mean, if we did it the other way, that there would have to be a consolidation that does not now exist. It would mean a change in the whole European system.

To do this there would have to be a consolidation of these various power companies so they could share back and forth the profit and loss.

Senator ANDERSON. What happens if he is going to make this type job of management and therefore his unit is going to last longer than the guaranty?

Take the 10,000 units that Mr. Floberg mentioned, he gets 15,000. Who profits because of that?

Dr. PITTMAN. It depends entirely on whether we have had to put any money into that particular project in the form of paying for failures of previous elements.

Senator ANDERSON. You said you were going to do this on a project-by-project basis. So can we confine it to this particular project?

This project gets its reactor; it performs 15,000 units instead of 10,000. There is no previous failure, is there?

What happens to that 5,000? Does it get it all?

Dr. PITTMAN. In this case, yes, sir. Since there was no previous money put in by the AEC to cover the guaranties, the utility operator under those conditions would get the entire benefit of better performance.

Senator ANDERSON. Then tell me what this sentence means:

> There would be provision for sharing of decreases in costs realized through performance of fuel in excess of guaranteed levels.

If he gets it all how do we share in it?

Mr. FLOBERG. There is a sharing to the extent that we had previously put money in the project.

Senator ANDERSON. No, we did not put any previous money in.

Dr. PITTMAN. Then there is no sharing.

Senator ANDERSON. Then what does this sentence mean:

> There would be provision for sharing of decreases in costs realized from the performance of fuel in excess of guaranteed levels.

Is that a fair statement?

Mr. FLOBERG. It is my sentence.

Senator ANDERSON. He is testifying on that. Go ahead. He said there will not be any sharing.

Mr. FLOBERG. My sentence means that there will be sharing in the case where we have previously had to pick up some of the guaranty.

Senator ANDERSON. But you did not say anything about that. We were talking about this fine print a while ago. Is this statement correct?

There would be provision for a sharing of decreases.

Now, we are going to have to pick up the tab if there are failures. Do we get a chance to profit if there are successes?

Mr. FLOBERG. Yes; if we have paid.

Senator ANDERSON. But we have not paid.

Mr. FLOBERG. The two sentences——

Senator ANDERSON. What two sentences? No; they do not read that way because you say the United States share of such savings. United States does not have any share in the savings unless it has made a previous contribution.

Mr. FLOBERG. That is correct; that is what those two sentences mean.

Senator ANDERSON. You explained that was in case we had paid something we would not get as much back from it. It could not exceed the cost.

Mr. FLOBERG. It could not exceed what we have paid in; that is correct.

Senator ANDERSON. Then the sentence should read that there will be no provision for the sharing of decreases unless we have previously contributed to the failure.

Mr. FLOBERG. If you prefer that, Senator, I will change it that way.

Senator ANDERSON. And then only to the amount of the failure?

Mr. FLOBERG. That is correct.

Senator ANDERSON. Would that not have been the easy way to say it?

Mr. FLOBERG. If I thought so I would have put it that way. I thought this was all right.

If you want me to change it that way, I will, but your understanding is correct.

Representative HOLIFIELD. The statement you have made is true provided you apply it to each individual contract, but as applied to the whole number of contracts it would not be clear.

As applied to the individual contract your statement as given here is true, although I appreciate the point that has been brought up here I hardly see how you could do it any other way because what we are actually doing is underwriting six different contracts between private companies in this country and private companies over there and you must consider each contract on an individual basis as far as this particular point is concerned, it seems to me.

Mr. FLOBERG. That was our position.

Senator PASTORE. Now that the Doctor has explained it, I quite agree with it, but the sentence itself was rather broad and ambiguous.

Now, it has been explained I think we all understand it. I understand how there would be no incentive to improve unless there were a premium if they exceeded the guaranty. I understand that.

I find no fault with it now, now that it has been explained, but the sentence was rather broad.

Senator ANDERSON. May I say I do not find any fault with it. I just wanted to find out what it meant.

Mr. FLOBERG. I apologize for my ambiguity.

Representative PRICE. Do we give these same guaranties domestically?

Mr. FLOBERG. No, sir; we do not.

Senator ANDERSON. Why not?

Mr. FLOBERG. Our approach in the domestic program has been quite different. It does not seem to us that these are the steps that should be taken in the case of the domestic program. It is quite a different program.

Mr. RAMEY. You have a comparison of your domestic program and the Euratom program as an exhibit, I believe.

Mr. FLOBERG. That is correct, it is attached to this statement, Senator. (See p. 211.)

Mr. RAMEY. For example, in the domestic program you have a waiver of fuel charges which you are not giving in the Euratom program?

Mr. FLOBERG. That is correct.

Mr. RAMEY. To some extent they balance out?

Mr. FLOBERG. To some extent they balance, but the machinery is quite different.

Chairman DURHAM. You may proceed.

Mr. FLOBERG. Thank you.

This arrangement has the merit of limiting AEC participation to 10 years of reactor operation or until the manufacturer's guaranty exceeds the Commission's, whichever occurs first. It is designed to preserve normal commercial practices both here and abroad while retaining sufficient Government control to assure the wise expenditure of funds. The guaranties have been established at a level considered essential to provide reasonable assurance that utilities will move ahead with the program. At the same time, however, they are proposed at a level that we expect will be matched by industry within a reasonable period. We have every confidence that American industry will, on its own, come close to and eventually will match if not exceed the guaranties being proposed and that the Government need to provide such assurances will diminish rapidly with the passage of time. This latter prospect will be particularly assured if the research and development program I have mentioned goes forward. Even if comparable guaranties are forthcoming from a limited number of companies in the near future, however, we are convinced that the European utilities will wish to receive the assurance that they can count on the proposed limits of fabrication costs and minimum life that this arrangement would offer.

Representative HOLIFIELD. Let me ask you a question at this time.

Is it not true that there has been a firm guaranty on the part of North American to Consumers of Nebraska in regard to fuel life?

Mr. FLOBERG. I will have to ask Dr. Davis to reply to that question because I don't know the answer to that question.

Mr. DAVIS. I do not believe this is true in the case of Consumers. Atomics International in Piqua, I believe, are making a guaranteed life of the fuel.

Of course, in some of the proposals made abroad the guaranties have been made on the life of the fuel both by Atomics International and other companies. I don't recall that there is what you call a guaranty of the life of the fuel in the Consumers case.

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Representative HOLIFIELD. I am under the impression that there is, but the Piqua case would illustrate the point which I wish to bring out here, that if there are individual companies now who will guarantee a fuel life, certainly the type of reactor which they are advocating should not be precluded from consideration, as I think the backup material does preclude the organic moderator.

Mr. FLOBERG. Mr. Holifield, before you came in we tried to make it clear——

Representative HOLIFIELD. I understand you did, but you have now accepted it.

I am not a special pleader for the organic moderated, but I say the same principle should apply to any type of reactor that might be developed. There might be some breakthrough, an exotic type of reactor brought out in the next year or two.

I would not want any type of reactor precluded from consideration in this program if it could be proven to be of reasonable substantial progress.

Mr. FLOBERG. The Commission certainly agrees with that. If somebody comes out with one that is buttermilk moderated and tomato juice cooled, and if it can still satisfy the time scale of this program, I see no reason why it shall not be incorporated in the overall framework provided we get the other parts of the definition satisfied that it is a proven type of reactor, and so forth.

Senator ANDERSON. The question is going to be How will it be proved?

Mr. FLOBERG. This is a matter of definition. The point is that we are not trying to exclude anybody on the basis——

Senator ANDERSON. May I give the comments of the Comptroller General on this point. You have reference to section 4. May I read it for you:

> Section 4 would authorize appropriations in the sum of $90 million for use in a program designed to assure that the charges to an operator of a reactor constructed under the joint program for fabricating, processing, and transporting of fuel will be no greater than would result from the fuel fabricating and fuel life guaranties which the Commission established for such reactor.
>
> We note the bill provides that action taken under the authority that was given AEC under sections 5, 6, and 7, must be in accordance with the terms of the agreement for cooperation. Howevre, no such limitation is made with respect to the authority that would be given under section 4.
>
> Attachment A to the memorandum of understanding regarding the joint nuclear power program proposed between Euratom and the United States of America is a detailed statement of the objectives of the fuel-cycle program and the guaranties that AEC would undertake in the fuel-cycle program. Particularly important provisions of this detailed statement are:
>
> 1. Arrangements whereby under certain conditions AEC would be credited with one-half of the resultant savings if certain operating results were better than AEC had guaranteed.

I do not know how to read that in conjunction with what Dr. Pittman has said:

> 2. The AEC guaranty would only be made when fuel elements were fabricated by a United States manufacturer or by a manufacturer in Euratom countries under an agreement with a United States firm or firms.
>
> We suggest that the Joint Committee consider the desirability of including a specific reference in the bill to this detailed statement so that AEC's authority to make the guaranties will be clearly subject to this provision of the detailed statement.

This reference could be made adding at page 2, line 19 after the word "program" the words "consistent with the terms of attachment A to the memorandum of understanding between the Government of the United States and the Community which is"—

and so forth.

In order that we may have your comment before we start working on the bill, could you give your comments on the remarks of the Comptroller General?

Mr. FLOBERG. Yes, sir; we will be glad to give you the comments. I have not seen that letter. We will be glad to supply for the record a comment on that point.

Senator ANDERSON. You see what he says?

Mr. FLOBERG. He says he wants to tie you down to what this provides in the attachment.

Senator ANDERSON. He wants to be sure that what is in the fine print gets in the main contract. He thinks that ought to be done.

We just want to know what your objection would be to putting it in the legislation.

Mr. FLOBERG. Off the top of my head, Senator Anderson, I see no objection, but I have not seen the letter.

Senator ANDERSON. I do not want to commit you under those circumstances.

Would you furnish us with a comment? A copy of this letter will be made available to you. It just arrived. The Comptroller General says:

We have previously commented on this legislation at the request of the Bureau of the Budget when it was in draft form.

So I assume they have made this comment before and it was ignored by the Commission. But I do not know that and, therefore, I would like to have your comments on it.

I am sure that Mr. Ramey will furnish you with a copy of this immediately because it just arrived in the committee.

Mr. FLOBERG. I don't think we have ever seen any previous comment, Senator, but I stand to be corrected on that if I am wrong.

Mr. RAMEY. I think the comment was to the Bureau of the Budget.

Mr. FLOBERG. I don't believe they passed them to us, but they may have.

Senator ANDERSON. The Bureau of the Budget would not pass on to the Atomic Energy Commission the comments of the Comptroller General of the United States?

Mr. FLOBERG. I don't believe they did in this case.

Senator ANDERSON. Would you check that? I believe that is important.

Mr. FLOBERG. I stand corrected if I am wrong.

(A copy of the Comptroller General's letter, together with additional material provided by the AEC follows:)

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, July 22, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. DURHAM: Reference is made to your letter of July 15, 1958, requesting our views on a draft bill to amend the Atomic Energy Act of 1954, as amended, and on related material transmitted by your letter. The draft

bill is cited as the "Euratom Cooperation Act of 1958" and is incorporated in the identical bills S. 4047 and H. R. 13119.

We had previously commented on this legislation at the request of the Bureau of the Budget when it was in draft form. At that time we did not have the international agreement, the agreement for cooperation, and related documents for review. Our letter to the Bureau of the Budget, dated June 18, 1958, contained 5 comments—2 of the comments have been resolved by changes in the legislation as submitted to the Congress, 2 of the comments have been resolved by information contained in the agreement for cooperation which we have now received and reviewed, and 1 of the comments is repeated in this letter.

Basically, of course, the desirability of giving the Commission the authority provided in these bills is a policy matter for determination by the Congress, and we make no comments in that area. S. 4047 and H. R. 13119 have 8 sections. We have no suggestions concerning sections 1 through 3 and section 8. Following are our comments on sections 4 through 7 of the bills and the agreement for cooperation.

Section 4 would authorize appropriations in the sum of $90 million for use in a program designed to assure that the charges to an operator, of a reactor constructed under the joint program, for fabricating, processing, and transporting fuel will be no greater than would result under the fuel fabricating and fuel life guaranties which the Commission establishes for such reactor. We note the bill provides that action taken under the authority that would be given AEC under sections 5, 6, and 7 must be in accordance with the terms of the agreement for cooperation; however, no such limitation is made with respect to the authority that would be given under section 4. Attachment A to the memorandum of understanding regarding the joint nuclear power program proposed between Euratom and the United States of America is a detailed statement of the objective of the fuel-cycle program and of the guaranties that AEC would undertake for the fuel-cycle program. Particularly important provisions of this detailed statement are (1) arrangements whereby under certain conditions AEC would be credited with one-half of the resulting savings if certain operating results were better than AEC had guaranteed, and (2) the AEC guaranty would only be made when fuel elements were fabricated by a United States manufacturer or by a manufacturer in Euratom countries under agreement with a United States firm or firms. We suggest that the Joint Committee consider the desirability of including a specific reference in the bill to this detailed statement so that AEC's authority to make the guaranties will be clearly subject to the provisions of the detailed statement. This reference could be made by adding at page 2, line 19, after the word "program" the words "consistent with the terms of attachment A to the memorandum of understanding between the Government of the United States and the community which is."

Section 5 of the bill would authorize AEC to "distribute" to the Community 30,000 kilograms of contained U–235 in accordance with the provisions of the agreement for cooperation. Article III A of the Agreement for Cooperation states that the AEC will "sell" to the Community up to a "net amount" of 30,000 kilograms of contained U–235. The term "net amount" is defined as the gross quantity of contained U–235 in uranium sold to the Community less the quantity of contained U–235 in recoverable uranium which has been resold or otherwise returned to the United States Government or transferred to any other nation or international organization with the approval of the United States Government. We suggest that at page 3, line 11, the word "sell" be substituted for the word "distribute" to make it clear thaat AEC shall be compensated for the special nuclear material furnished by the Community.

Section 6 of the bill would authorize AEC, in accordance with the terms of the agreement for cooperation, for such periods as the Commission may deem necessary or desirable, to provide for the processing, fabricating, separating or refining in facilities owned by AEC of source, byproduct, or other material or special nuclear material. This language seems to be somewhat broader than necessary to provide the service contemplated in article III D of the agreement for cooperation which arranges for AEC to perform chemical reprocessing services with respect to any source or special nuclear material received by the Community from the United States under this program. It should be noted that the authority that would be provided in section 6 of this bill is similar to the authority requested in section 6 of H. R. 13120 and S. 4048 now being considered by the Joint Committee. Also, no specific time limit for the period that AEC can perform such services is provided in the bill or the agreement

for cooperation. We suggest that the Joint Committee might wish to consider the desirability of providing a specific time limit for the period that AEC can perform such services to deter an indefinite reliance by the Community upon AEC for such services and to provide some safeguard against a possible over-expansion of AEC facilities designed to perform such services.

Section 7 (a) of the bill would authorize AEC to purchase "or otherwise acquire" special nuclear material from the Community in accordance with the terms of the agreement for cooperation. Also, section 7 (b) would require that no contract for such purchases should provide for "compensation or" the payment of a price in excess of AEC established prices for such material. Article III E of the agreement for cooperation states simply that the United States Government is prepared to purchase any special nuclear material produced in reactors fueled with materials obtained from the United States. Because the agreement for cooperation is specific as to the means of AEC's acquiring the special nuclear material; namely, by purchase, we do not know the significance of or the need for the words "or otherwise acquire" at page 4, line 9 or the words "compensation or" at page 5, line 3 in the bill.

Section 7 (b) of the bill would limit AEC's authority to acquire plutonium from the Community to 4,100 kilograms. Article III E of the agreement for cooperation provides that the United States Government is prepared to purchase any special nuclear material (which includes plutonium) produced in reactors fueled with material obtained from the United States. This provision apparently does not limit AEC's obligation to purchase plutonium, and seems to be inconsistent with the above provision of section 7 (b) of the bill. We, of course, have no idea as to how much plutonium might be produced under the proposed arrangements with Euratom; however, since the agreement for cooperation would be a binding agreement between governments for a period of 25 years, we raise the question for the consideration of the Joint Committee whether the unlimited obligation of AEC to purchase plutonium under the agreement for cooperation would affect the provision of section 7 (b) of the bill which would limit AEC's authority to acquire plutonium to 4,100 kilograms.

With respect to the agreement for cooperation we have the following comments.

Article I B 2 of the agreement for cooperation, which agreement was initialed by representatives of the United States Government on June 19, 1958, states that the United States Government will provide financing to the Community up to $135 million in the form of a long-term line of credit on terms and conditions to be agreed. The June 23, 1958, letter of the Chairman of the Atomic Energy Commission to the chairman of the Joint Committee on Atomic Energy states that financing up to $135 million would be provided to Euratom by the Export-Import Bank in the form of a long-term line of credit at 4½ percent interest to cover a portion of the total capital cost. We suggest that the rate of interest to be charged by the United States Government on its long-term line of credit be included in article I B 2 of the agreement for cooperation.

Article III B of the agreement for cooperation provides that payment by the Community for enriched uranium may be made on different bases, under terms and conditions to be agreed. Appendix F of the material submitted by the Chairman, AEC, to the chairman, JCAE, is a summary of funding—joint United States-Euratom cooperative program. Paragraph 5 of this summary contains the detailed arrangements under which the Community will make payment for enriched uranium. We suggest that the detailed arrangements contained in paragraph 5 of appendix F be made a part of the agreement for cooperation.

Article III E of the agreement for cooperation gives the International Atomic Energy Agency (IAEA) a first option to purchase any special nuclear material produced in reactors fueled with materials obtained from the United States under the agreement, if such material is in excess of the Community's need therefor for peaceful uses. The article further provides that the United States Government is prepared to purchase such material at its domestic fuel value price in effect at the time of purchase, if the IAEA does not do so. Thus, while the United States Government is apparently obligated to purchase all such material as may not be wanted by the Community and the IAEA, there is no corresponding obligation on the part of the Community to sell such material to the United States Government in the event the material might be needed for its peaceful uses. In view of the 25-year life of the agreement and the technological advances in the art of peaceful utilization of such material which

may come about within that time, we suggest that the committee consider the possible desirability of securing a right of first refusal to such material and of providing for periodic determinations by the United States Government during the 25-year period as to the amounts to be made available to the IAEA.

Sincerely yours,

JOSEPH CAMPBELL,
Comptroller General of the United States.

ATTACHMENT A

VIEWS ON COMPTROLLER GENERAL'S COMMENTS

Section 6

We understand that the Congress presently has under consideration a section similar to this in H. R. 13482 which would have general applicability for performance of the services covered by section 6. This bill clearly spells out the time limitations. These limitations would not interfere with the Euratom program and we have no objection to incorporating these limitations in this section.

Section 7a

In preparing this section we followed the wording of section 55 of the present act and included the phrase "or otherwise acquire." We believe that this language would permit the Commission, for example, to lease such material or even accept a gift, if we believed it was to the Commission's advantage to acquire this material other than by purchase. However, we would have no objection, if the committee desired, to the deletion of this phrase.

The phrase "compensation for" was taken from the language discussed with the JCAE staff with regard to amendment of section 55 and was included to assure that if the Commission credit Euratom for material as distinct for making cash payment for such material it would do so for no more than the prices provided for in the proposed bill.

Section 7b

This section contains the understandings of the parties with respect to the period of time and the estimate of plutonium which the Commission would procure from Euratom. The agreement for cooperation would not permit the acquisition of additional quantities of plutonium in excess of the quantities set forth in the Euratom Cooperation Act. The agreement provides that its implementation is subject to authorization under United States laws.

If the Congress at a later date authorizes the Commission to acquire additional quantities of plutonium, the Commission could do so under the agreement.

The GAO letter suggests that the rate of interest on the capital loan (art. I–B2) and the provisions relating to the payments for enriched uranium (art. III–B) which are described in paragraph 5 of appendix F of the material submitted with our letter of June 23, 1958, should be incorporated in the agreement. We do not believe that these matters should be incorporated in the agreement for cooperation. As we stated, it is our intention, and the intention of Euratom, to proceed as outlined in the references set forth in the GAO letter. We believe that these are matters which should be contained in the specific contracts providing for transfer of material or in the loan arrangements between Euratom and the Export-Import Bank.

As previously stated, the Commission is under an obligation to purchase plutonium only for the 10-year period provided for in the draft bill. The Commission does not believe it necessary to obtain a first option on this material. Although the Commission will have a good, peaceful use for all the plutonium that becomes available, the objective to be achieved was not so much the guaranty of the supply of this relatively modest amount of plutonium to the Commission as much as it was to present an assured market to the producers of plutonium in the Community during the period of the joint program.

The provision with respect to the IAEA was included in recognition of the role which the IAEA may play in the peaceful development of atomic energy, and we believe that it would not be consistent with this intention to provide for the Commission to have a unilateral right to determine the quantities of material to be made available by Euratom to the Agency.

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington, D. C., July 29, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. DURHAM: As a result of our review of the Commission's testimony before the Joint Committee on the proposed program with Euratom, we have prepared a list of answers (attachment A) to the remaining questions raised by the Comptroller General in his letter to you dated July 22, 1958. The Commission already has provided the Joint Committee with its views as to the points raised by the Comptroller General on sections 4 and 5 of the proposed Euratom Cooperation Act of 1958.

In addition, you will recall that during the hearing on July 23, 1958, Senator Anderson inquired as to whether the comments of the Comptroller General, as contained in his letter of July 22, 1958, previously had been communicated to the Bureau of the Budget and, in turn, communicated by the Bureau to the Commission. I have been advised that these comments were not furnished to the Bureau of the Budget and hence they were not available to the Commission. The reference in the second paragraph of the Comptroller General's letter to comments that were provided to the Bureau refers to some earlier comments that were made by the General Accounting Office on the proposed legislation. These earlier comments, of course, were provided to the Commission by the Bureau at the time.

I understand that the Department of State separately has provided the committee additional material to substantiate our belief that member states are obligated under the terms of the Euratom Treaty to balance all approved budgetary commitments, as well as a status report on the Community's progress in organizing its program.

As you will recall, in your letter to Dr. Libby of July 9, 1958, you indicated that it would be desirable for the Commission to bring up to date its statement of last year on foreign atomic power programs for inclusion as an appendix to the Euratom hearings. Attachment B is a special report on the status of reactor project within the member states of Euratom. (See p. 364.) If any additional information is desired, we will be happy to provide it.

Sincerely yours,

JOHN F. FLOBERG, *Commissioner.*

RESPONSE BY AEC TO QUESTIONS RAISED BY THE GENERAL ACCOUNTING OFFICE ON SECTIONS 4 AND 5 OF THE PROPOSED EURATOM COOPERATION ACT OF 1958

This statement responds to the Joint Committee's request for our comments on the Comptroller General's letter of July 22 as it relates to sections 4 and 5 of the proposed Euratom Cooperation Act of 1958.

We would see no reason why the additional language proposed for insertion in section 4 should not be added, since it reflects the firm intention of the parties.

As to section 5, the Comptroller General suggests that the word "distribute" should be changed to "sell" in order to make it clear that AEC is to be compensated for the special nuclear material furnished to the Community. The change is not needed for this purpose, since section 54 of the Atomic Energy Act of 1954, as amended, specifically requires that the Commission be compensated, at not less than the Commission's published charges applicable to domestic distribution, for special nuclear material "distributed" to other nations, unless otherwise authorized by law. We do not have and are not seeking authorization to dis-

tribute the material to Euratom at less than our published charges. Aside from this, the substitution of the word "sell" would require amendment of section 5 if at a later date Euratom policy should permit lease and the parties agreed on a mutually satisfactory leasing arrangement. (See letter, Cook to Kohnstamm, June 12, 1958, pp. 34–35 of the Joint Committee print.) A change from sale to lease would require an amendment to the agreement for cooperation in any event, and we question the need for requiring that an amendment to our legislative authorization also be obtained.

Mr. RAMEY. On the question of your fuel-cycle guaranties, the point of the reasonableness of the basis of your guaranty has been raised a time or two as to whether or not a manufacturer might just raise his price or a group of manufacturers might, because they were going to be guaranteed.

It is my understanding that the Commission is considering getting a most-favored-nations clause, or something like that, from manufacturers.

Mr. FLOBERG. That is our intention.

Could I ask Dr. Pittman to respond specifically to that?

Dr. PITTMAN. I assume what you mean is that if a company offers a better guaranty to anybody else at the time they are offering the guaranties under the Euratom program that there would be a clause in the contract we have with the fabricator which would say that the same guaranties would apply to the Euratom program.

This would be a matter for incorporation in the contract we would have with the fabricator of the fuel.

It is our intention that at the same time the guaranties are made by the fabricator of the fuel, for the Euratom program, that there are no better outstanding guaranties to anybody else under any other program, for that type of fuel.

Senator PASTORE. What is wrong with writing it in the bill?

Mr. FLOBERG. It seems to me it would encumber the bill pretty much.

Senator PASTORE. Why would it?

Mr. FLOBERG. It seems to me these details are in this record and that is just as good as having them in this bill.

Senator ANDERSON. Do you mean to say if we are supplying automobile tires to Euratom and the manufacturer would only give us a 5,000-mile guaranty, but he gives later on somebody else a 10,000-mile guaranty for the same thing, we should not have the benefit of that?

Mr. FLOBERG. We should have and we intend to get it, sir.

Senator ANDERSON. That is what Senator Pastore's question was, why should that not be in the bill?

Mr. FLOBERG. My answer is that we intend to get it.

Senator ANDERSON. Yes.

Senator PASTORE. You are making this guaranty to the Euratom nations. The guide you have is not the record. The guide you have is the law. Then you will not have any dispute with it. It is a commonsense agreement.

I do not see why it should not be incorporated in the law so you would not have any argument over it.

The chance is you might have a dispute over it. This is not binding on Euratom.

What we write in the law is basically part of your jurisdiction. Inasmuch as this is fundamental, I see no harm in putting it in the bill.

It burdens the bill, but it merits a little consideration if you raise the point.

Mr. FLOBERG. If you put it in your report or something like that it is just as good as far as I am concerned as having it in the law.

Senator ANDERSON. In this room here there was a provision written into a report with reference to rapid amortization of certain properties. It was written in on representations of the Treasury Department that that is what would be done.

The bill became law and the Department of Justice said:

We cannot recognize what is in the report.

Under those circumstances you would not blame the child, if his fingers got burned, for fearing the fire.

The point is that this is a guaranty that an American manufacturer is going to give to somebody here at home. Why can he not guarantee his Government what he can guarantee a private citizen.

Mr. FLOBERG. We agree with you, Senator. We intend to do exactly that.

Senator ANDERSON. Euratom is not involved in it?

Mr. FLOBERG. No, sir.

My only argument with Senator Pastore's question is a lawyer's argument, whether it is a cleaner bill without that section in it.

It is your job to decide.

Senator ANDERSON. The cleanest bill we can write is to say we authorize the Atomic Energy Commission to do anything you please; that would be a clean bill.

The Congress does not operate quite that way.

Mr. FLOBERG. It would be so clean, Senator, that we would not recognize it.

Chairman DURHAM. Are there any other questions on this section?

If not, we will go to capital loans.

Mr. FLOBERG. I have one more paragraph to read here.

Section 4 of the proposed legislation would provide the funds and other authority necessary to carry out this aspect of the joint program. Contracts entered into under this section would not extend for a period longer than that necessary to cover fuel loaded into a reactor constructed under the joint program during 10 years of its operation or prior to December 31, 1973, whichever is earlier. You will note that an authorization for $90 million is being requested to cover the estimated cost of this phase of the program. This amount establishes a ceiling on the overall costs that will be borne by the

United States for such guaranties. It is a maximum estimate and on the basis of our expectation of the guaranties that will be made by private industry, we believe that the costs to government will be somewhat below this amount.

I consider this phase of the program to be vital to the success of the entire effort. The detailed arrangements are described in attachment A to the memorandum of understanding that was furnished to the joint committee under our letter of June 23, 1958.

2. CAPITAL LOANS

The capital costs for nuclear plants are, of course, substantially higher than those for conventional plants. The investment costs for the plants to be constructed under this program can be expected to be more than twice that of new conventional plants in Europe. On the basis of an average cost of $350 per installed kilowatt of capacity the total capital cost, exclusive of fuel, is estimated not to exceed $350 million.

In view of this comparatively high cost it was agreed that it would be desirable to take some special steps to make sure that adequate investment capital is available on attractive terms for the program. Under the program, accordingly, most of the capital funds would be provided for by the participating utilities and other European sources, such financing to be arranged with the appropriate assistance of Euratom and the Investment Bank of the Common Market. The United States, however, through the Export-Import Bank, would provide Euratom up to $135 million in the form of a long-term line of credit at an interest rate of 4½ percent. These funds would be provided from the lending authority made available to the bank in fiscal year 1959.

Preliminary contracts by Euratom with European utilities have indicated that the utilities will have no difficulty in arranging financing equivalent to that which otherwise would be needed for 1 million kilowatts of new conventional power (about $150 million). This, plus the United States loan of $135 million, leaves approximately $65 million to be found of the overall capital costs of the program. The President of the Euratom Commission already has approached the European Investment Bank and has asked that the bank take the lead in arranging for the financing of this remaining $65 million; Euratom has informed us of its confidence that these or funds from other sources will be forthcoming.

Senator ANDERSON. Could you tell us what security the Export-Import Bank will get for the $135 million that it will advance?

Mr. FLOBERG. I think it would be best to refer that either to the bank or to the State Department.

Senator ANDERSON. I do not believe any arrangement has been made, but if we have to get that——

Mr. FLOBERG. Mr. Schaetzel, from the State Department, is here. Could I ask him to respond to that question?

STATEMENT OF J. ROBERT SCHAETZEL, OFFICE OF SPECIAL ASSISTANT TO THE SECRETARY FOR DISARMAMENT AND ATOMIC ENERGY, DEPARTMENT OF STATE

Mr. SCHAETZEL. Senator Anderson, under the terms of the Euratom Treaty any obligation which Euratom enters is backed by the full resources of the six members.

This action is taken and was taken at the time this agreement was put before the Council of Ministers which under their Federal system is made up of ministerial people from the six countries.

So through that action and subsequent actions on the loan agreement when it is negotiated between the Export-Import Bank and the Community, the full resources of the six nations of the Community are behind the loan.

Senator ANDERSON. In the same shape that a government bond of those countries would be pledged?

Mr. SCHAETZEL. Yes, sir.

Senator ANDERSON. Can you give me the title that says that?

Mr. SCHAETZEL. In the treaty, sir?

Senator ANDERSON. Yes, sir.

Mr. SCHAETZEL. I am sorry, Senator; I cannot right now. I will supply that for the record.

Senator ANDERSON. I will be glad to give you a copy of it.

Mr. FLOBERG. He says in the Euratom Treaty.

Senator ANDERSON. Senator Pastore asked for that earlier to be supplied for the record. You can see now why we need it.

Senator PASTORE. There is no doubt in your mind about that condition?

Mr. FLOBERG. No, sir.

Senator PASTORE. The full faith and credit of each individual government is pledged in the agreement made in Euratom?

Mr. SCHAETZEL. That is our understanding from the preliminary discussion held in Luxembourg and when representatives of Euratom had discussions with the Export-Import Bank in May and June.

Senator ANDERSON. You recognize that you have put enough loopholes in that to take a 10-ton truck through.

This was a preliminary discussion, not a final discussion, in an exploratory fashion, not final fashion.

What did they decide? You certainly have not asked for recommendation of a loan for $135 million without knowing whether the full faith and credit of these countries has been pledged?

Mr. SCHAETZEL. No, Senator.

Senator ANDERSON. What has been done?

Mr. SCHAETZEL. The procedural aspects of this are that the Export-Import Bank has indicated its willingness to enter negotiations with Euratom in support of this program, if the program is approved by the Congress. There will be no loan unless the documents before you are acted upon favorably.

At that time the bank would enter formally into negotiations with the Community.

Senator ANDERSON. I realize that, but the question is: When the bank enters into these negotiations—the President has said that they have offered to lend them $135 million—my original question is: What security do you have?

You say the full faith and credit of these countries will be pleged. What have you to sustain that?

Mr. SCHAETZEL. The fact that the documents now before you have been acted upon by the Euratom Commission and the Council of Ministers.

Senator ANDERSON. What in those documents says that? I asked you that. Here they are.

Can you find in them anything that says the full faith and credit of these countries will be pledged, the same as a Government bond?

Mr. SCHAETZEL. On page 48 of the committee print the first indent and second indent deal with this question.

Senator ANDERSON. You are on page 23 where it says:

> Up to $125 million will be provided by the Government of the United States to the Community in the form of a long-term line of credit under terms and conditions to be agreed.

Mr. SCHAETZEL. Senator, I am sorry. I am speaking to page 48 of the committee print.

Senator ANDERSON. Is this not a little binding where it says "terms and conditions to be agreed"?

It looks as though they had not been agreed upon. You know the interest rate, but has any full faith and credit of the country been pledged or authorized to be pledged?

Mr. SCHAETZEL. This would be in connection with the subsequent loan negotiations between the Euratom Commission and the Export-Import Bank. They will be entered into at that time in contractual arrangements to meet the point you are making, that is, specify the full faith and credit of the Community and the member States.

Senator ANDERSON. But it has not been done as yet, then?

Mr. SCHAETZEL. No, sir; nothing has happened except an indication that the United States is prepared to enter into such negotiations.

Senator ANDERSON. What have they indicated, that they are willing to pledge full faith and credit?

Mr. SCHAETZEL. They have said so. This is on their side as well a part of subsequent negotiations.

Senator ANDERSON. I wish you would examine the record. I think you indicated earlier that the full faith and credit was pledged or had been pledged. What is the situation? Has nothing been pledged?

Mr. SCHAETZEL. Senator, I may not be following—obviously I am not following your line of questioning.

Senator ANDERSON. The question is this: We are about to lend $135 million from the Export-Import Bank to Euratom.

Now, I do not think Euratom has any real assets because I think they are going to provide this money immediately to utilities who are going to build the plants.

We have understood up to now that the governments were going to guarantee this loan by pledging their full faith and credit; is that not correct?

Mr. SCHAETZEL. Senator, my understanding of the situation is that the first step has been taken, which is the negotiations between the Euratom Commission and the United States, in which the line of credit is part of the overall program.

None of the programs have been acted upon on this side, as yet.

In contrast the Euratom Commission and the Council of Ministers have acted on the documents before you. They understand, as you do, that the loan negotiations take place subsequently and are directly between the Export-Import Bank and the Euratom Commission.

At that time, it is our understanding, the loan agreement will be taken to the Council of Ministers, which is the means by which the member states give the necessary guaranties for the line of credit.

Now, article 171 of the Euratom Treaty, section 1 of that article says—would you like me to read it in the record?

> Estimates shall be drawn up for each financial year for all revenues and expenditures of the Community other than those of the agency and joint enterprises and shall appear either in the operational budget or in the research and investment budget.
>
> Each budget shall be in balance as to revenues and expenditures.
>
> 2. Estimates of the revenues and expenditures of the agency, which shall operate in accordance with customary business usage, shall appear in a separate statement.
>
> The conditions governing the estimates, implementations, and verification of of these revenues and expenditures shall be determined, having due regard to the statute of the agency, in the financial regulations adopted pursuant to article 183.
>
> 3. The estimates of revenues and expenditures, together with the trading accounts and balance sheets of Joint Enterprises for each financial year, shall be communicated to the Commission, the Council, and the Assembly in accordance with the provisions laid down in the statutes of those Enterprises.

Senator ANDERSON. You will concede this is nothing more than the ordinary agreement to what happens in the day-by-day operating and running of a business, but somebody has to put up some venture capital for that business.

You have not touched on that at all. That is the point I am trying to get to. Is there or is there not any pledge whatever or will there be required before the Export-Import Bank makes a loan, a pledge of the full faith and credit of these six nations?

Mr. FLOBERG. May I interrupt at this point to call your attention to one of the working papers at the top of page 48 of the committee print?

Senator ANDERSON. I would like to have it in the agreement. Working papers are referred to, but I do not believe they are binding.

Mr. SCHAETZEL. May Mr. Metzger from the legal advisory staff speak on this. He engaged in the actual preliminary financial discussions in Luxemburg on this point.

STATEMENT OF STANLEY D. METZGER, ASSISTANT LEGAL ADVISER FOR ECONOMIC AFFAIRS, DEPARTMENT OF STATE

Mr. METZGER. Senator, the working paper No. VII which begins on page 47——

Representative VAN ZANDT. Will the witness stand up.

Mr. METZGER. Working paper No. VII which begins on page 47 and continues to page 48 of the document containing the proposed Euratom agreements which are before you, deals with this problem.

Senator ANDERSON. What page did you say again?

Mr. METZGER. Forty-seven and forty-eight.

The particular paragraphs that deal with this problem of security for the Export-Import Bank loan specifically are two paragraphs on page 48. Perhaps it would be best if they were read.

This particular issue that you have raised was a subject of our discussions over there where the questions which you have put were uppermost in our minds.

This joint working paper evolved from the discussions of this very point. It says as follows:

The question of security for the United States loan—

That is $135 million loan that Export-Import Bank will engage in with the Commission—

has several aspects. On the one hand it was pointed out—

Here I might add by the Euratom people—

that the unconditional commitment of repayment of principal and interest by the Community was buttressed by the unconditional obligation undertaken by the six member countries in the treaty to provide the funds necessary to balance the budgets of the Community including the investment budget. Since a loan to the Community from the United States constitutes a budgetary commitment approved by the Council of Ministers, the full faith and credit of the Community is supplemented by treaty obligations of the member countries to furnish the necessary resources in proportions specified in the treaty.

Senator ANDERSON. Will you tell me if there is any guaranty there?

Mr. METZGER. If I could just continue with the next and then wrap it up, I think it would give the picture.

On the other hand, it was pointed out—

and I should add by us—

that the Community has no perennial resource other than that to be provided by member countries to support the budgets and no power to levy to secure such resources and that the obligation of member countries ran to the Community but not to lenders to the Community.

So we were perfectly well aware of the problem you are raising.

Now, how to resolve this. The following paragraph says:

There was also discussion whether or not an act of pledge similar to that entered into by the European Coal and Steel Community was necessary or appropriate in the light of the considerations mentioned in the two preceding paragraphs.

I can explain that in some detail in a moment.

The inconvenience of such a mechanism as well as other factors relating to it were also discussed.

Then a few subsidiary points were discussed. It winds up by saying:

It is clear that further consideration of these matters is necessary.

Now, where will it be necessary? In the loan negotiations which will take place between the Community and the Export-Import Bank.

Senator ANDERSON. As a legal representative will you require the full faith and credit of these countries to be pledged for these loans?

Mr. METZGER. I will certainly recommend it. I am not deciding anything.

Senator ANDERSON. Who will look after the protection of the loan?

Mr. METZGER. The Export-Import Bank negotiations, the Export-Import Bank loan contract will carry in it the security for repayment of the loan, as well as the schedule of repayments of principal and interest.

That is the normal place for them to be.

Representative HOLIFIELD. Is there anything in the Export-Import Bank charter which requires the type of security that the Senator has been speaking of, No. 1; No. 2, is this loan to be considered on the basis of a normal conventional Export-Import Bank loan, or is it to be considered on the basis of lesser security than is ordinarily required?

Mr. METZGER. I am not intimately acquainted with the Ex-Import Bank charter, but I do not believe that the Ex-Import Bank is bound in its charter to any specific types of securities.

I believe that they are supposed to make loans which bear reasonable promise of repayment and that they have wide leeway in determining what kinds of terms and conditions to include.

I should add that, because this is a loan agreement with a community, there are some special kinds of problems, Senator.

We had this kind of problem in the loan negotiations that took place about 4 years ago with the European Coal and Steel Community.

Now, in that agreement some new devices were used. In that case you had a different situation to some extent. The European Coal and Steel Community had some resources of its own at the time and had the power to levy to secure additional resources.

Senator ANDERSON. Which Euratom does not have?

Mr. METZGER. It does not have the power to levy; that is correct.

Senator ANDERSON. That makes quite a bit of difference in lending, does it not?

Mr. METZGER. I think so.

Senator ANDERSON. Yes, because the bonds of the state that are based on its power to levy carry quite a different rate than the ordinary producing bonds that are not based on the power to levy.

Mr. METZGER. I believe that is right.

In the Coal and Steel Community loan, the Community pledged its full faith and credit.

It should be added, of course, that at the time the resources that the Coal and Steel Community had were not sufficient to pay off the principal and interest on the $100 million loan that was made to them.

I believe they had very, very much less at the time. I believe now they have that much.

To back up that Coal and Steel Community pledge of full faith and credit, there was an arrangement called an act of pledge which was a

highly complex affair under which the underlying paper which they received from the coal enterprises to whom they relent the proceeds of the borrowings from the United States, whatever underlying paper they got from them—and we did not require them to get this or that type, there was no requirement they get a mortgage lien—but whatever type they got from the relending of our funds and whatever type they got from the relending of funds that the Community borrowed from other sources, such as the Swiss, which they later borrowed from, would go into a common pledge so that if there was a default which the Community could not meet because it did not have resources of its own, that underlying paper would be shared equitably and equally among all the borrowers so that the Swiss would not stand in the position of having good paper and we would stand in the position of having poor paper; if the Swiss had good and bad paper and we had good and bad paper, all the lenders to the Community would share equally and ratably.

Now, that was the system that was evolved as a buttress in the Coal and Steel Community $100 million loan to the full faith and credit of the Community, which had less at the time than the amount to satisfy the obligation, the total obligation, which they incurred.

Now, this is the kind of subject that has to be worked out in a loan negotiation.

What we attempted to do in Luxembourg was to establish the metes and bounds of this problem, to indicate to them what we were worried about.

They indicated to us that we need not morry because here you had individual member governments pledged under the treaty to the Community.

We pointed out to them that is very well and good, it is to the Community, but it does not run directly through the Community to us.

We identified these problems and highlighted them and recognized that they could only be solved in the context of a particular loan negotiation which has not happened yet.

Senator ANDERSON. Therefore, what you said was that you recognized and highlighted them and did not solve them?

Mr. METZGER. Quite right.

We could not solve them until we had a negotiation.

Senator PASTORE. May I ask a question on the mechanics of this.

As I understand this now, Euratom will have $150 million. Where will they get this cash? From whom?

Mr. SCHAETZEL. I am sorry, I did not recognize the figure.

Senator PASTORE. $150 million they are going to put up; $65 million they are going to borrow from the investment bank on the common market; and $135 million we are going to provide; is that right?

Mr. SCHAETZEL. I am sorry, Senator. The financial calculation was built up on the basis that the European utilities would raise from their normal sources of capital $150 million, which is approximately——

Senator PASTORE. That is my question. These are private utilities companies, are they not?

Mr. SCHAETZEL. That is right.

Senator PASTORE. In each of these countries?

Mr. FLOBERG. Private or public.

Senator PASTORE. In each instance, the private utility will come along and make an application to Euratom to build a reactor. Now, does it have to present its program to Euratom and receive the money back after it has already put the money in? How is this going to work? How does this financing take place? How does it all happen? What are the arrangements?

Mr. SCHAETZEL. As Mr. Metzger pointed out, we merely indicated that we explored the problems to be resolved.

As far as the $215 million which the Europeans will raise, they don't have the full answers to these questions yet. They have gotten such assurances that, in their opinion, the money is available.

The European utilities which have expressed an interest in the program have said that they believe they can get the money—which they will raise.

So far as the $65 million is concerned, this, too, will be raised.

In one case, the German Government has indicated its willingness to make certain lines of credit available.

The European Investment Bank has indicated interest in sharing in the program.

The difficulty, in fact, in answering the question now, is that the arrangements have not been firmed up yet.

Senator PASTORE. When Mr. Giordani was here, I remember he was my tablemate, and I asked him the question. I asked him, "Who is going to build these reactors? Is Euratom going to build them in the various countries, or is each country going to build its own?" He said, "We are going to build our own reactors." Now, that is not the case, is it?

Mr. SCHAETZEL. It is the case, Senator. The question divides into two parts; the utilities will own and operate the reactors. The second part of the question——

Senator PASTORE. But will be financed by an institution which they themselves are financing?

Mr. SCHAETZEL. Not the utilities; the governments will be financing, in part.

Senator PASTORE. In other words, maybe the public utility will put up some of the money; maybe its own government will put up part of it, too.

Mr. SCHAETZEL. In the case of France, the indication is that it will be the French Government, because Electricité de France is a public utility, and the French Government will finance their share.

Senator PASTORE. And then application to build the reactor in its own country?

Mr. SCHAETZEL. That is right.

Senator ANDERSON. Your statement later on, Mr. Floberg, says:

> Traditionally conservative, and bound by rate ceilings, the utilities are not prepared to take excessive risks or to invest large amounts of capital in plants in which the cost of energy produced may be well above that of conventional stations.
>
> All these will be well above that of conventional stations.

So, how do we believe these utilities will put up $150 million? Have they provided any enforcible guaranties that they are prepared to put up $150 million?

Mr. FLOBERG. Not enforcible guaranties, to my knowledge, Senator; no. This is their communication to us there through the Euratom machinery.

Senator ANDERSON. Could we believe that the entire project may fall through because of their inability to put the $150 million up?

Mr. FLOBERG. If the inability became proved, it would fall through, Senator, but I am not that pessimistic.

Senator ANDERSON. Well, the inability would come up unless you guaranteed a low rate within their conventional cost. You are not in a position to do that, are you? There is nothing in the law that would permit you to guarantee a low cost of energy, is there, or in the proposed law?

Mr. FLOBERG. This is not what is guaranteed at all.

Senator ANDERSON. There is nothing in it that guarantees. So, the statement you make on page 6 of your question-and-answer section is that these—

> utilities are not prepared to take excessive risks or to invest large amounts of capital in plants in which the cost may be well above that of conventional stations.

If you say they are not enforcible guaranties, what current guaranties, offers, or pledges have individual utilities made that they will comport with $150 million?

Mr. FLOBERG. What are you reading from, Senator?

Senator ANDERSON. The question-and-answer section you, yourself, provided.

Mr. FLOBERG. What page is that?

Senator ANDERSON. At the bottom of page 6, the last paragraph.

Mr. FLOBERG. I see. What this sentence meant to say, Senator, is that we are pointing out here, in connection with the requirement for the fuel-cycle guaranty, that the costs will not be too far above conventional costs.

Senator ANDERSON. I am sorry.

Mr. FLOBERG. What this sentence meant to convey, Senator, is that we are pointing here to the requirement for the fuel-cycle guaranties, and that their cost will not be too far out of proportion to the conventional cost.

Senator ANDERSON. I think the guaranty of the fuel-cycle possibilities is a good help. What I am trying to ask is:

How far along is this deal? The Export-Import Bank is not able to solve the question whether it gets any security by guaranties from member banks. You have no evidence that the utilities will put up $150 million; you have no pledge they will. Nobody knows where the other $65 million is coming from.

The only thing we can count on this far is that the Government of the United States will supply this material, will put up $135 million, will put up $50 million and so forth. What is there for a bottom in this deal?

Mr. FLOBERG. Senator, the bottom is the proposal that we are making to you, and the action of this Congress. That is the cornerstone of all the future developments of this program. It is certainly clear to me we should not expect to have all these details answered today, because the cornerstone has not been laid yet.

Senator ANDERSON. You mean before we lay the cornerstone of the building we do not go in to find out where our financing is coming from? We are doing that every day in American business.

Mr. FLOBERG. That is right, but we are mixing our figures of speech.

Senator ANDERSON. No, sir; if I am going to build a building, I try to find out, first, if I can finance it. And the builder will not start building it until he knows I have the money on the line.

Mr. FLOBERG. But he will talk to you about building.

Senator ANDERSON. That is right, but he won't sign a contract until he knows where the money is coming from.

Mr. FLOBERG. That is correct.

Senator ANDERSON. In this instance after we put up $135 million, or offer to, and the President's offer is a firm one, they would certainly require in ordinary prudence that we get some security.

After we put it up, are we then going to be told, "We are sorry, we cannot get the assurance of the Government to support this," and they will not pledge the full faith and credit, "We are very sorry, but the utilities will not put up the $150 million; also you guarantee the cost will not exceed $8 million and we are awfully sorry but we cannot find the $65 million"?

"Now, come back to the American Congress and get us all the rest of the $350 million."

What assurance have you got that is not so? Do you have 1 letter from 1 utility?

Mr. COOK. We have correspondence from the Euratom Commission itself.

Senator ANDERSON. Do you have 1 letter from 1 utility or do they say they have 1 letter from 1 utility that they will come forth with their share of the money?

Mr. COOK. Their advice to us is based on their discussions with utilities. I do not know whether they have letters.

Senator ANDERSON. Is it not a fact they do not have the pledge of a single dollar for this? I am so informed.

Is there anything wrong with that information?

Mr. FLOBERG. I don't know about that word "pledge," and I would not dispute it.

The point is that negotiations do not take place in the form of pledges. They take place in the form of discussions as to anticipated available capital.

Senator ANDERSON. Negotiations do not, but contracts do and this is the contract.

Mr. FLOBERG. We have not got to the contract stage.

Senator ANDERSON. Yes; you are asking Congress to get to its part of the contract.

Mr. FLOBERG. The action of the Congress is that indispensable condition precedent to the formation of the contract. We are asking you to lay the foundation upon which the contract can be constructed.

Senator ANDERSON. Does the contract come back to the Congress for approval?

Mr. FLOBERG. No.

Senator ANDERSON. So the Congress has to see it before it signs a blank check; does it not?

Mr. FLOBERG. No, sir; not at all. The outline of the proposal is perfectly clear in the record and we are trying to make it clear. There won't be a dollar of our money going into this program until the money is available from the Euratom side of this deal.

Senator ANDERSON. The $150 million and the $65 million?

Mr. FLOBERG. It will be on a project by project basis. The whole thing does not spring full grown from the head of Jove. These are summary figures.

Senator PASTORE. In other words, if the $215 million is not forthcoming, is there any obligation on our part with reference to the $135 million?

Mr. FLOBERG. No; it does not cost us a dime until their money is put up.

Senator PASTORE. What we are concerned with here is the legislation under 124 to give the authority within certain limits to negotiate this agreement that we are talking about?

Mr. FLOBERG. That is correct.

Senator PASTORE. Which is contingent upon their carrying out their memorandum of understanding and the part they have assumed under the memorandum of understanding which will ultimately lead to the agreement for cooperation which will be the instrument of agreement?

Mr. FLOBERG. That is correct.

Senator ANDERSON. You talked a while ago about legislative history. Do you then have sufficient legislative history to say that no part of this $135 million or the $50 million for research and development is going to be put up until this money is on the barrelhead in proper proportion for each 1 of the 6?

Whatever share is necessary for the reactor will be available, pledged, and that the firm commitments are made for that; that you will always have the firm commitment pledge on the faith and credit of the countries for payment of the $135 million before a dollar of our money is spent?

Mr. FLOBERG. That is certainly my understanding of it.

Senator PASTORE. I think you would be subject to impeachment if you did not do it that way.

Mr. FLOBERG. I prefer to avoid that consequence.

Senator ANDERSON. I am not a lawyer, but I would hate to try to impeach the Export-Import Bank.

Senator PASTORE. I think the Export-Import Bank would be awfully foolish if it put up its money without the other side putting up its money, too. I would assume they would undertake that responsibility.

I am speaking here in terms of we getting ourselves beyond the scope of this law and changing the scope of this law by negotiations.

I think, myself, that would be dereliction of duty. That is all I am going to say.

Mr. FLOBERG. I don't represent the Export-Import Bank, but I am stating to you what my understanding of a sound procedure would be. I assume theirs would be consistent with that, if not identical.

Senator ANDERSON (presiding). Proceed with your statement, sir.

3. LONG-TERM AVAILABILITY OF FUEL

It was recognized that, as an integral part of the program, it would be necessary to provide the Community with an ample assurance regarding the long-term availability of fuel over the operating period for the reactors involved. We agreed that the transfer of fuel

would have to take place on terms that adequately recognized the provisions of article 86 of the Euratom Treaty, which reads as follows:

> Special fissionable materials shall be the property of the Community.
> The Community's right of ownership shall extend to all special fissionable materials produced or imported by a member state, a person or enterprise and subject to the safety control provided for in chapter VII.

In this regard it should be noted that the drafters of the treaty felt that the insertion of this provision was vitally important to strengthen the Community's control responsibilities and they asked the United States Government for advice. This was one of the few cases where the United States became involved in the formulation of the treaty. The United States Government stated that the insertion in the treaty of the concept of Community ownership would be beneficial to strengthening the Community and that this requirement would be consistent with policy adopted by the United States under the Atomic Energy Act.

Accordingly, under the arrangements proposed, the United States will sell to the Community a net quantity of 30,000 kilograms of contained U–235 in uranium (valued at approximately $400 million on the present schedule of charges) to cover the fueling and other requirements of the program for such material over a 20-year operating period. Of this amount 21,000 kilograms, which are now valued at approximately $300 million would be paid for as delivered on a current basis. This quantity would include 20,000 kilograms for estimated burnup and process losses over the 20-year operation period, and 1,000 kilograms for research and test reactors associated with the program. The remaining quantity of 9,000 kilograms (valued at about $100 million) would cover the initial operating inventory and would be sold to the Community on a deferred-payment basis.

Senator ANDERSON. Mr. Floberg, you heard the questions I directed to the Assistant Under Secretary of State yesterday. You agree that the payment of $100 million would be in the form of a promissory note?

Mr. FLOBERG. I do not agree with that. The word "pay" to me means paid with money.

Senator ANDERSON. I am glad you do not regard that as payment. I signed a terrific note the other day and I thought I paid something with it.

Mr. FLOBERG. You have to pay that note some day.

Senator ANDERSON. That is right. But would you not say that "paid for" would be a promissory note?

Mr. FLOBERG. No, sir; I do not think so.

Senator ANDERSON. You do not think that a promissory note pays for anything?

Mr. FLOBERG. No; it substitutes one kind of obligation for another.

Senator ANDERSON. That is a distinction I can only get from a lawyer because a businessman feels, when he goes in to sign a note for something, he has paid for it.

Mr. FLOBERG. It is not my intention to apply that concept to this transaction.

Senator HICKENLOOPER. I do not agree that a note is in all cases payment. The beneficiary of the note may receive his payment but the signer of the note has not paid the bill yet until he discharges his

obligation under his note. So it may be partial payment at least to the person who has the money coming unless he accepts that note and can cash it, but he has not received payment until that obligation is discharged.

Senator PASTORE. There is a fundamental involved. A note is only a promise to pay.

Senator ANDERSON. I am up against three lawyers.

Senator PASTORE. Now, with reference to the question that was raised by Senator Anderson previously, where it may not be fundamentally our primary responsibility for a pledge on the part of the particular nation with regard to the loan made by the Export-Import Bank, now with relation to this 9,000 kilograms which is under the first payment, there our obligation runs to Euratom.

In that instance, now this fundamental becomes your concern. This is no longer to be charged upon the Export-Import Bank. In that case what pledge is there as to full faith and credit? Now we are getting to the crux. Now we are dealing with Euratom which is merely an instrumentality to do a certain thing. It is not a government. It is only a combination through an agreement to do certain things.

Now, our credit is between Euratom and the United States Government and you have an obligations that runs here to $100 million that is deferred over a period of time.

Now, what responsibility does each nation assume with reference to that and what is our agreement with regard to that? We are not talking about the Export-Import Bank now. We are talking about the United States and Euratom.

Mr. FLOBERG. Senator, I think the answer to your question is that the terms of the agreement for cooperation say that this will be made available under terms and conditions to be agreed and we intend to get adequate security to protect this investment.

Senator ANDERSON. I am sorry, that is not the program, is it? I do not mean to contradict you this roughly, but my understanding was you were to transfer 9,000 kilograms and give them full title to it without any mortgage back.

Have I stated it correctly?

Mr. FLOBERG. You have paraphrased it correctly, yes, sir; except that your phrase "without any mortgage back" is too broad. We intend to have a lien that is the equivalent of a purchase money mortgage.

Senator ANDERSON. What is the difference?

Well, all right.

Mr. FLOBERG. The agreement for cooperation provides that this fuel will be made available along the outline that Senator Anderson has described and that the terms and conditions of repayment will be agreed upon.

Now, in implementing this in any particular instance——

Senator ANDERSON. Do you mean that the terms and conditions are going to be agreed upon later? I thought we had agreed they were going to have it for 10 years without any payments.

Mr. FLOBERG. I am talking about the nature of the security and the responsibility of the participants in the transaction and the degree of protection we get for the recovery of this money.

Senator ANDERSON. I can only say that I do not think that is a detail. You have reached an agreement with them. You are going to give them $100 million worth of uranium. You are going to transfer title immediately. They will keep it for 10 years, paying interest only. And after the 10 years they will start to pay it off in equal installments. That is an important part of the transaction, is it not? Now, 10 years with interest only is an important consideration. We do not retain title. We deliver title at once even though no payment starts for 10 years.

Mr. FLOBERG. That is correct.

Senator PASTORE. I think that needs a little clarification. You mean they are going to stockpile this U–235?

Mr. FLOBERG. We are not going to stockpile at all.

Senator PASTORE. You are going to act more or less as a broker. They will assume the title but you will only transfer the amount they will need to put in the reactor.

Mr. FLOBERG. It will be delivered as required. What it amounts to is that the initial inventory is not paid for at once but this inventory is replaced constantly as burnup takes place. What we have, in effect, is an advance of the initial inventory as required.

Senator ANDERSON. Can I give you the comment—again I apologize that you have not had this letter in advance—but the General Accounting Office says,

Section 5 of the bill would authorize AEC to distribute to the Community 30,000 kilograms of contained U–235 in accordance with the provisions of the agreement for cooperation.

Article 3 (a) of the agreement for cooperation states that the AEC will sell to the Community up to a net amount of 30,000 kilograms of contained U–235. The term "net amount" is defined as the gross quantity of contained U–235 uranium sold to the Community less the quantity of contained U–235 of recoverable uranium which has been resold or otherwise returned to the United States Government or transferred to any other nation or international organization with the approval of the United States Government.

We suggest that at page 3, line 11, the word "sell" be substituted for the word "distribute" to make it clear that the AEC shall be compensated for the special nuclear material furnished to the Community.

How does that suggestion strike you?

Mr. FLOBERG. Subject to correcting the record when I have had a little time to think about this, Senator, I would say that offhand the substitution of one word for another does not bother me particularly.

Can I put my head together with a couple of these fellows here?

Senator ANDERSON. If anything has been submitted to you without a previous chance to look at it you will have ample time to look at it and make subsequent comments on it.

What would you think in section 5, line 12 of the bill, of changing 30,000 kilograms to 9,000 kilograms and letting them come back, 5, 7, or 8 years later and tell us what they need?

Mr. FLOBERG. I think that would be a terrific restriction on the program. They have to know now what fuels will be available or they cannot make a 20-year plan of operation.

Senator ANDERSON. You mean they should not have faith in us but we should have faith in them?

Mr. FLOBERG. I mean the faith we have is matched by the faith in us in terms that we will deliver what we agree.

Senator ANDERSON. Generally speaking, we say that 30,000 kilograms will be available. We authorize now 9,000 at this time. You do not think it would be wise to cut it to nine?

Mr. FLOBERG. No; if I were on the other side I think that would be terrific restriction. That would be like buying an automobile with a full tank of gasoline under circumstances such that the possibility of buying further gasoline was uncertain.

Senator ANDERSON. They really think we are going to have some faith in them. We expect to give them $100 million of this, give them title to it, free of charge, and they do not pay us a nickel except the interest on it for 10 years. We expect to have that much faith in them. But when we want them to have a little faith in us that is a terrific handicap.

Mr. FLOBERG. I do not think it is comparable at all. We are going to sell it to them, deliver it to them. It is true the payments are on a deferred basis but that is only on the initial inventory.

Senator ANDERSON. Mr. Durham recommended at one time that we lease it to them. I think he recommended we lease it. What would be wrong with leasing it and our retaining title to it?

Mr. FLOBERG. From my standpoint, there would be nothing wrong with that.

Senator ANDERSON. Is it that they want title to it so they can borrow money on it?

Mr. FLOBERG. No, sir.

Senator ANDERSON. Why do they need title if they do not use it to borrow money on? If you agree that the lease does everything.

Mr. FLOBERG. Except satisfy the provision of the Euratom Treaty.

Senator ANDERSON. Is there anything in the Euratom Treaty that says we have to sell it to them without a downpayment instead of a lease?

Mr. FLOBERG. No. Their treaty provides they must own the material.

Senator ANDERSON. Their treaty provides that?

Mr. FLOBERG. That is correct, or at least their lawyers find difficulty in interpreting it otherwise.

Senator ANDERSON. They tell us what to do with our own material.

Mr. FLOBERG. This provision was put in the treaty at our suggestion some time ago.

Senator ANDERSON. We suggested that?

Mr. FLOBERG. Apparently so. Apparently this Government did suggest that. The reason for this, I am told, was to keep the title of this material in Euratom as compared with the elements of Euratom, the integers of Euratom. In order to achieve that, Euratom's treaty, after considerable negotiations, between the members, provided that Euratom itself shall hold title.

Incidentally, title to me as a lawyer does not impress me as a very significant concept. It is a legal concept of convenience.

Senator ANDERSON. I want to tell you the things I own I like to have title to. It may not bother you but it bothers me.

Mr. FLOBERG. Title is like barometric pressure, which is not nearly so important as what is happening to it. The technical location of

title is important because it locates rights and risks, but this result can be achieved by contract terms as well as by title location.

Senator ANDERSON. We do not have either title, possession, or security; is that correct?

Mr. FLOBERG. If I can read the next page of this statement, if I can read a little further, I think I can answer this question. If I do not answer it, you come right back and hit me with it again.

Senator ANDERSON. I look over at Mr. Vance, who has sold lots of automobiles and his dealers have sold lots of automobiles and I do not imagine any dealer ever gave a man an automobile and said, "You take this, you run it through its useful life and at the end of that time, you come and pay me for it." I do not believe he did, but maybe he did.

All right. Go ahead.

Mr. FLOBERG. I am resuming at page 11, the third paragraph.

Euratom has advised us that it intends to make available the fuel received to its utilities on terms comparable to those provided by the Commission within this country. The use charge they plan to establish may include a modest charge for the actual, administrative expenses associated with handling the material. This point will be covered in the contracts relating to the transfer of fuel.

Section 5 of the proposed bill contains the congressional authorization which is required, pursuant to section 54 of the Atomic Energy Act, before quantities of special nuclear material may be transferred to Euratom.

Ownership and responsibility for the approximate quantity of 21,000 kilograms of special nuclear material which Euratom would purchase in cash would be transferred to the Community at a designated port or ports of embarkation. In the case of the initial operating inventory of about 9,000 kilograms made available under a deferred payment plan the Commission would retain such rights in the material as are appropriate to secure the payment of the debt under the sales agreement.

Under this arrangement the Commission would obtain from the Community, in essence, a first lien on special nuclear material made available to the Community. The Commission would have the right of return of such quantities of special nuclear material in the event the Community failed to pay its debt. The Community also would have to take such steps, satisfactory to the Commission, as are necessary to assure that such material would be returned to the Commission unencumbered. Finally, the Community would be called upon to agree that, it would not create any obligations in such material which would have priority over the Commission's rights.

I might add that in the final analysis, the real security for the payment of the amounts due lies in the fact that the Community is prepared to base a substantial portion of its nuclear power program on United States-furnished uranium. The supply of such uranium is not a one-time operation and sales and resales of such material are continually necessary in order to keep the reactors operating. Failure of the Community to pay any portion of the debt would permit the Commission to cease delivering material. It is highly unlikely that this situation would occur in view of the substantial investments that the Europeans will make in the program. For these reasons I believe

that if we proceed on the basis I have outlined the United States will have adequate assurance that the debt due from the Community on a deferred payment will be discharged.

Senator ANDERSON. May I say, Mr. Floberg, that we have the farm bill on the Senate floor and some of us need to go there. Besides, there will be questions on this section that Mr. Holifield and others are going to raise.

So I think we will have to terminate at this time and ask you to come back again tomorrow.

Senator PASTORE. May I ask a question before we do? Obviously there must be a reason. This is quite unorthodox, the fact that you transfer the material and you transfer the title without compensation for it, that is without being paid for it. That is rather an unorthodox proceeding.

An American usually understands that where you do not pay an obligation and you sell it on installments usually the title remains in the vendor.

Now, here the title goes to the vendee. Now you have a reason for it. There must be a reason. It must be because Euratom, in dealing with its own composition of nations, will have to have that title.

Now, I think what you ought to do, Mr. Floberg, so that we will not get into any controversy about this, is explain why we are doing this. There must be some reason why you are passing title, why they are insisting on title being passed.

For that reason, I think you ought to put it in the record. This is actually in the reverse. I quite agree with you that the fact that you normally have fictional title will not entitle you to replevin any more than an agreement to give it back to you if it is enforceable at all. For that reason I think you ought to spell out in the record what your reasons for it are. There must be some reasons for it. Thus far you have not stated them. You are merely saying this, you could get the stuff back if it is not paid for just as easily as if it were leased to them, if you passed the title.

There must be some reason why you are doing this.

Mr. FLOBERG. I will respond to it as soon as the committee reconvenes.

Senator ANDERSON. Did it not deal with the question of inspection and control? I see a lot of nodding of heads. That is what the question was, was it not?

Mr. SCHAETZEL. Yes, sir. I do not know whether you want me to answer this now or whether you want to take it up as Mr. Floberg suggested.

Senator ANDERSON. I am happy to take it up as he suggested, but in order to get around the question of control and security——

Mr. SCHAETZEL. The purpose of ownership by the drafters of the treaty was to assure that the Community would have effective control of atomic energy development within the Community. This was to buttress their safeguarding control arrangements.

I might say the provision on ownership took place long before any program of this sort was ever conceived. This was in the mind of the Europeans themselves.

Mr. Floberg mentioned this was the one point in the drafting of the treaty where we were consulted as a Government. They asked us what

our advice was on the basis that all special nuclear material under existing law is owned by the United States Government. They felt this was a wise move.

We assured them in our judgment that it was and this is one of the reasons the ownership provision is now in the Euratom treaty.

(Supplementary statement on this matter, by the State Department, follows:)

SALE ARRANGEMENT

At the close of the hearing before the Joint Committee on Atomic Energy on July 23, 1958, several committee members had inquired as to why the proposal submitted to the committee provided for an outright sale of fuel, with a deferred payment arrangement regarding the initial inventory, instead of a lease or some other arrangement under which title to that initial inventory would remain in the United States.

The provisions in the Euratom treaty which provide that the Community shall have exclusive ownership of fissionable materials produced or imported by member states were among the last ones inserted in the treaty prior to signature. Their incorporation was the culmination of an extended and vigorous debate. During the formulation of the treaty some groups within the Community were in favor of ownership by private industry and others favored ownership by member states. The proponents of a strong community, in contrast, however, felt that it would be of paramount importance to vest exclusive ownership in the Community so as to strengthen the status of the new organization and to buttress its important control responsibilities. During the final stages in drafting the Treaty the negotiators asked the United States for its advice on this problem. The United States stated that the insertion in the treaty of the concept of Community ownership would be beneficial to strengthening the Community and would be consistent with the practice in this country. As a result of all these factors, article 86 was included in the treaty, as follows:

"Special fissionable materials shall be the property of the Community. The Community's right of ownership shall extend to all special fissionable materials produced or imported by a member state, a person or enterprise and subject to the safety control provided for in chapter VII."

Whether this provision is so categorical as to prohibit leasing of fissionable material from a nonmember country such as the United States, raises real legal questions, and Euratom counsel has expressed his concern over the legal uncertainties involving Euratom's possession of fissionable material under any terms other than ownership. Regardless of the resolution of the legal problems, however, the basic internal political problem, in light of the history of the development of article 86, is an obvious one. Both the legal and political problems were pointed to by Euratom as negativing the practicability of leasing enriched uranium, even on the same terms and conditions as are available domestically within the United States, at least in connection with Euratom's first real substantive effort. The United States negotiators recognized the reasonableness of this position and consequently agreed to the terms you have before you, including the arrangement which gives the sale the financial equivalent of lease for the initial inventory for the first 10 years of operation.

Senator ANDERSON. The committee will meet tomorrow morning in room P–63 in the Capitol, the Old Supreme Court Chamber at 10 o'clock to complete the AEC testimony.

We will also ask an Export-Import Bank witness to be present on this question of what security they get.

(Whereupon, at 12:25 p. m., Wednesday, July 23, 1958, the committee recessed, to reconvene at 10 a. m., Thursday, July 24, 1958.)

PROPOSED EURATOM AGREEMENTS

THURSDAY, JULY 24, 1958

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met, pursuant to recess, at 10 a. m., in room P-63, the Capitol, Hon. Carl T. Durham (chairman of the committee) presiding.

Present: Representatives Durham, Holifield, Price, Van Zandt, Patterson, Aspinall, and Hosmer; Senators Anderson, Pastore, Bricker, and Dworshak.

Also present: James T. Ramey, executive director; David R. Toll, staff counsel; George E. Brown, Jr., George F. Murphy, staff members; Capt. Nels Nelson, United States Navy, consultant, Joint Committee on Atomic Energy.

Chairman DURHAM. The committee will come to order. This morning we will continue with the AEC statement.

I believe, Mr. Floberg, we had reached the top of page 13 of your prepared statement.

STATEMENT OF HON. JOHN S. FLOBERG, COMMISSIONER, ATOMIC ENERGY COMMISSION—Resumed

Mr. FLOBERG. Before I resume reading, Mr. Chairman, I would like to call to your attention that I have this morning given to your staff a letter addresed to you with enclosures, being certain things that were asked for in the course of the hearing yesterday, such as copies of certain letters and responses to the problems raised by the General Accounting Office letter.

Chairman DURHAM. I think we agreed yesterday to put those in the record.

Mr. FLOBERG. Yes, sir, and your staff now has them.

Chairman DURHAM. All right, we will put them in the record. (See pp. 125.)

Mr. FLOBERG. The next point, Mr. Chairman, is at the conclusion of yesterday's hearing Senator Pastore had asked for a specific response to a question of his regarding the title arrangements.

I would like to give a direct answer to that.

I have a few copies here, typewritten, that I would ask to have passed out to the members of the committee so they can follow the reading at this point into the record.

At the close of the hearing before the Joint Committee on Atomic Energy on July 23, 1958, several committee members had inquired as to why the proposal submitted to the committee provided for an outright sale of fuel, with a deferred payment arrangement regarding the

initial inventory, instead of a lease or some other arrangement under which title to that initial inventory would remain in the United States.

The provisions of the Euratom treaty which provide that the Community shall have exclusive ownership of fissionable materials produced or imported by member states were among the last ones inserted in the treaty prior to signature.

Their incorporation was the culmination of an extended and vigorous debate.

During the formulation of the Treaty some groups within the Community were in favor of ownership by private industry and others favored ownership by member states.

The proponents of a strong Community, in contrast, however, felt that it would be of paramount importance to vest exclusive ownership in the Community so as to strengthen the status of the new organization and to buttress its important control responsibilities.

During the final stages in drafting the Treaty, the negotiators asked the United States for its advice on this problem. The United States stated that the insertion in the Treaty of the concept of Community ownership would be beneficial to strengthening the Communtiy and would be consistent with the practice in this country.

As a result of all these factors, article 86 was included in the Treaty, as follows:

> Special fissionable materials shall be the property of the Community. The Community's right of ownership shall extend to all special fissionable materials produced or imported by a member state, a person or enterprise and subject to the safety control provided for in chapter VII.

Whether this provision is so categorical as to prohibit leasing of fissionable material from a nonmember country such as the United States, raises real legal questions, and Euratom counsel has expressed his concern over the legal uncertainties involving Euratom's possession of fissionable material under any terms other than ownership. (See Mr. Floberg's proposed insert.)

Regardless of the resolution of the legal problems, the basic internal political problem, in the light of the history of the development of article 86, is an obvious one.

Both the legal and political problems were pointed to by Euratom as negativing the practicability of leasing enriched uranium, even on the same terms and conditions as are available domestically within the United States, at least in connection with Euratom's first real substantive effort.

The United States negotiators recognized the reasonableness of this position and consequently agreed to the terms you have before you, including the arrangement which gives the sale the financial equivalent of lease for the initial inventory for the first 10 years of operation.

Senator PASTORE. I understand that we have an agreement that we can recoup possession in the case of failure to pay, as well as we could if we retained legal title.

Mr. FLOBERG. That is correct.

Senator PASTORE. This was merely an agreement that was reached in order to facilitate the idea on the part of Euratom that it would exclusively hold title to all fissionable material whether it was pro-

duced by individual nations as members of the Community or whether they would buy it from the United States on the condition they could retain this title in order to control it better in order to distribute to the member countries.

Mr. FLOBERG. That is correct; that is my understanding, Senator.

Chairman DURHAM. Is that the only condition under which we can recoup the material?

Mr. FLOBERG. You mean failure to pay?

Chairman DURHAM. Failure to pay?

Mr. FLOBERG. Yes, sir; that is correct.

Chairman DURHAM. Only two conditions?

Senator PASTORE. Which would be the only right we would have once we had transferred the possession, whether we have maintained and held the title.

Mr. FLOBERG. That is true.

In answer to Mr. Durham's question, violation of the safeguards provision would also give us the right to recoup the material.

Senator ANDERSON. Did you straighten out the $200 million?

At page 104 of the hearings, you said that Euratom had quite a bit of assets. You said the word "they," they have, a couple hundred million dollars of assets right now. I said "They do?"

You said, "Euratom has; yes, sir."

I said "$200 million right now?"

You said, "Yes, sir."

I said, "I question that statement."

Now, I still question it this morning. I understand that they have nothing but pledges. They do not have $15,000 in cash in the till. You say they have $200 million. Do they have them in bonds, or what is it in?

Mr. FLOBERG. Could I ask Mr. Schaetzel to respond to you, Senator?

Senator ANDERSON. Yes; I will be happy to have him respond. You made the statement. That is the reason I asked you, Mr. Floberg. I want him to answer me by saying they have a commitment. You said they had cash on the barrelhead, money right now. My information is that they do not have a dollar, and we are just $200 million apart on a $200 million item.

Now, I shall be happy to have him answer it, but I do not want him to answer it by saying in the light of all circumstances we believe we are justified at some future date somebody may be depending upon to put up this money. I want him to talk about $200 million in assets.

Mr. FLOBERG. Let him answer it, and see if it satisfies you.

STATEMENT OF J. ROBERT SCHAETZEL, OFFICE OF SPECIAL ASSISTANT TO THE SECRETARY FOR DISARMAMENT AND ATOMIC ENERGY, DEPARTMENT OF STATE

Mr. SCHAETZEL. At the July 23 session of the Joint Committee hearings on the Euratom program, the question was raised concerning the fund available to the Community for its projects.

The financial provisions of the Euratom treaty provides a mechanism for the Euratom Commission to receive contributions from the

member states, both for its operational budget and its research and investment budget.

The treaty negotiators, recognizing that the Commission would take some time to organize its work, decided to include the outlines of a research and instructional program in the treaty itself.

Article 215 authorizes an initial program of up to $215 million to be carried out over the first 5 years of treaty operation. The details of this program are set forth in annex V to the treaty, which it might be useful to put in the record, Senator.

Senator ANDERSON. The list of the $200 million in bonds and what they have will be far more useful in the record, if you have that.

Mr. SCHAETZEL. In accordance with annex V, we understand that plans for the creation of a joint research center and other research and instructional programs are now under consideration in the Euratom Commission.

Budgets for 1958 and 1959 expenditures are being drawn up by the Commission for transmittal to the Council, according to Euratom procedures. These budgets will be part of the overall 5-year, $215 million program.

Somewhat analogous to United States procedures, the Euratom Commission has at present the obligation authority up to $215 million.

Senator ANDERSON. Would you read that again?

Mr. SCHAETZEL. Somewhat analogous to United States procedures——

Senator ANDERSON. What does "somewhat analogous to United States procedures" mean?

Mr. SCHAETZEL. The problem, Senator, is that Euratom institutions are not comparable to our institutions. So, when we talk about the Euratom Commission, it is not the same as the executive branch. When we talk about the Council of Ministers, it is not the same as the United States Legislature. So, when I say "somewhat analogous," we are trying to compare their procedure with ours to be helpful to the committee.

Senator ANDERSON. You mean completely different from our procedures, or what?

You say somewhat analogous to our procedures?

Mr. SCHAETZEL. Yes, because it stems from the fact that Euratom is set up on a parliamentary system so that the Council of Ministers——

Senator ANDERSON. Can you give us a quick answer and then read the rest to us? Do they have one dollar in the till?

Mr. SCHAETZEL. Would you permit me to finish the statement, first?

Senator ANDERSON. I do not mind. I would just like to get the answer sometime. Obviously, you do not want to answer it, but go ahead.

Mr. SCHAETZEL. Senator, we are trying to answer it, to the best of our knowledge.

Senator ANDERSON. Is it not a fact that they do not have one dollar? Could you just answer that statement?

Mr. SCHAETZEL. That is not my understanding.

Senator ANDERSON. What do they have?

Mr. SCHAETZEL. I don't know how much assets they have, Senator?

Senator ANDERSON. Why do you not answer it, if they have anything? They have a mechanism set up to receive, and the budget is

to cover running expenses. It is not to cover capital expenditures, so far as I have been able to understand. The source of my information still says they do not have any money. This is the statement: "They have $200 million in assets."

I said, "Two hundred million dollars right now?"

And the answer is "Yes, sir."

Now, that is on the barrelhead. I want to know what it is invested in; who has it?

Mr. SCHAETZEL. Our understanding of the procedure is, and this is a paraphrase of what will come later in this brief statement, that the act of ratifying the treaty, in a sense, authorized $215 million.

Senator ANDERSON. Will you give me a legal reason why that is true? My understanding is that it did not. I will be happy to have you give me on what you base that. The mere ratification of the treaty does not give them a nickel.

Mr. SCHAETZEL. I can only say that our understanding of it is that the $215 million was authorized at the time the treaty was ratified by the parliamentary action of the 6 member states, and they have then to go back to the Council of Ministers for appropriation.

Senator ANDERSON. The Congress of the United States is about to finish up its appropriation bills, and they will authorize $70 billion. Does that mean we have $70 billion in the Treasury to pay those bills?

Mr. SCHAETZEL. No, sir; then you go through the appropriation procedure.

Senator ANDERSON. Precisely. This is not the question. This question is: Do they have assets right now? Procedures are not assets. You can set up a paving district in a municipality; you say that that municipality can go through a certain petitioning motion to set up a paving district; then the city commission can approve it; the bonding attorneys approve it; then they can go ahead and pave it, but that does not mean that they have the money right now.

I still want to know if they have a dollar. If so, in whose name is it deposited and where is it deposited? Can you tell me of any money they have deposited anywhere?

Mr. SCHAETZEL. I cannot answer that. We are not responsible for the Euratom Commission.

Senator PASTORE. You can answer that. Of course you can. You can agree with Mr. Anderson that insofar as apparent, physical proceed assets are concerned, there are no such things at the present time.

But the machinery has been set up whereby the commitments have been made and that the money in the future will be forthcoming as far as you understand.

But you are not answering his question because yesterday the impression was left here that these physical assets were already in the possession of Euratom.

The potentiality is there, but the actual assets are not. You could answer it that way and we would have avoided all this.

All Mr. Anderson is trying to establish is that as of the moment there are no physical capital possessions on the part of Euratom that adds up to $200 million outside of the commitments that have already been made by the ministers back in their countries that this money will be forthcoming when it is needed.

That is all you have to say. Why do you have to hassle over this for 20 minutes?

Mr. SCHAETZEL. That is one reason I want to finish the statement.

Senator ANDERSON. Go ahead and finish it.

Mr. SCHAETZEL. May I read this one sentence again?

Somewhat analogous to United States procedures the Euratom Commission has at present obligation authority up to $215 million. It must return to its legislative body, the Council, for expenditure authority. Council action will constitute a commitment by the six governments to contribute to the budgets approved.

Senator ANDERSON. You mean only for expenditure authority, it has to go back to its member governments for the money as well?

It has nothing in the world now, but the authority to go in and say "We believe we can sign our names to a budget running $215 million," but the member country has not guaranteed a nickel of it by that process.

It has to come back to the respective congresses of those countries which is the reason I challenge the statement.

Mr. SCHAETZEL. Under the joint United States-Euratom program, the Commission will include in its budget plans Euratom's share of $50 million of the joint $100 million research program.

The Euratom Council, in view of its action in May on the joint program, has given its approval to inclusion of this amount in the Commission's research budget.

With regard to the broader question, the Community's ability to establish credit, it should be noted again, reference to working paper VII, page 48 of the committee print that the Euratom Treaty, article 171, paragraph 1, provides that:

Each budget including the investment budget shall be balanced with revenues and expenditures. The Council of Ministers acting in the name of the member government approving the terms of the loan accepts the budgetary commitment of the funds necessary to pay interest and principal on such a loan.

I agree with you, Senator Anderson, and I was not trying to evade the question, that they have, what I think we would call in our system, authorized the $215 million, they must go back to the Council of Ministers for the actual money, itself.

Senator ANDERSON. Now, would you comment on whether or not they have $200 million of assets right now?

Mr. SCHAETZEL. This was my statement, Senator Anderson.

Senator ANDERSON. I asked you to answer my question about it. Do they have $200 million?

Mr. SCHAETZEL. They do not have $215 million in the bank.

Senator ANDERSON. I only would like to have you answer the words. The words were not $215 million; they were $200 million. Do they have a couple hundred million dollars of assets right now?

Mr. SCHAETZEL. No, sir.

Senator ANDERSON. Thank you.

Mr. FLOBERG. Senator, I think they do. These are accounts receivable.

Senator ANDERSON. I will be happy to argue with you. They are not accounts receivable. They are not available until somebody in authority pledges the assets of the corporation to it. I get now in a bad field. You are a lawyer and there are too many good lawyers here.

Senator PASTORE. You are doing all right, Mr. Anderson.

Senator ANDERSON. It is my information they do not have a nickel.

They have no authority to commit their government for a nickel. They have the right to ask the governments for the money and if the governments put up the money, fine. They have not done anything in one country yet to actually put up any money.

That is all I am trying to get at. They are in no hurry.

Mr. FLOBERG. I think I would like to take issue with you on it. These are in effect subscriptions or were subscriptions that were made by the various members of Euratom to the Euratom organization.

Senator ANDERSON. By which somebody authorizes the commitment of the government financially for $50 million or $100 million.

Mr. FLOBERG. Yes, sir; I believe so.

Senator ANDERSON. Can you show the authorization from the government?

Mr. FLOBERG. The treaty itself is such an authorization, Senator. I so interpret it.

Senator ANDERSON. When it gets to that, I will let you take on Senator Bricker. He knows something about treaties and I do not. I do not think that is a commitment on the part of the government.

There is no money specified in the treaty; is there?

Mr. FLOBERG. The amount in actual units of money is not specified, but it says in the treaty that the governments will support it and that the budget will be balanced.

This is a drawing account on the member government, so to speak.

Senator ANDERSON. It is a drawing account?

Mr. FLOBERG. I would so regard it. I would call it a subscription just like any corporate subscription.

Senator ANDERSON. Will you have your people submit the portion of the treaty which you think is a drawing account on the treasuries of other countries? I shall be glad to take a look at it. I do not think it is.

I only say that because there is an awful lot of talk of hurry. They want us to get all of our ducks in a row.

Why do they not get the thing ready abroad?

Mr. FLOBERG. Senator, I think they are one step ahead of us in this financial arrangement so far.

Senator ANDERSON. I do not know. I understand the World Bank has made a commitment for $135 million. We are going to have testimony by the Export-Import Bank. That is more money than all the rest of them have committed to put together 2 or 3 times over, I think 135 million times.

Mr. FLOBERG. Of course, they are paying their operating expenses today.

Senator ANDERSON. Which run a few dollars a month.

Mr. FLOBERG. I suspect it is not much. I still think, Senator, that my statement is a correct statement. You may be right, and I may be wrong, but I am still prepared to stand on it.

Senator ANDERSON. You understand, Mr. Floberg, this is not an attempt to stir up a personal argument between us on this. I will say I was delighted with the presentation you made yesterday. I thought it was very fine. I think the whole paper was very good.

I only say when we start to obligate several hundred million dollars, I think we ought to do what an ordinary businessman would do if he was obligating $10,000; namely, find out who is about to sign

the papers, what sort of security will he have, and what sort of security does the man have who is behind the paper. We do that all the time in commercial transactions.

Mr. FLOBERG. I could not agree with you more, and I think we are doing it.

I will resume, then, Mr. Chairman, at the top of page 15.

Chairman DURHAM. In scheduling these hearings we have run into more lengthy discussions by AEC than we expected to have. We had scheduled witnesses.

Is General Klein here?

Representative HOLIFIELD. We rolled over the part in regard to section 3 pretty fast yesterday, $50 million for research and development. It is on page 2 of the bill, section 3.

I do not have a chance to ask questions on that section, Mr. Chairman. I think you covered it in your statement, did you not?

Mr. FLOBERG. Yes, sir; we have gone through that.

Representative HOLIFIELD. Have you gone through the research and development part of your statement? You did have fuel-cycle guaranty on page 8.

I think probably my question is predicated on that point anyway, so I think I could ask you the question I have in mind right now because it is involved with the fuel-cycle guaranty. Now, we submitted a series of questions to the commission and we have their answers back.

On question 18:

What will the United States patent policy be with respect to American fuel element fabricators through whom the AEC extends full element guaranties?

STATEMENT OF MAJ. GEN. JULIUS KLEIN

Chairman DURHAM. General Klein, I understand you want to make a statement. How long will it take you?

General KLEIN. About 15 minutes.

Chairman DURHAM. All right, we will give you 15 minutes.

General KLEIN. Thank you very much, sir.

Chairman DURHAM. Identify yourself, please.

General KLEIN. I am Julius Klein, of Chicago.

Chairman DURHAM. We are glad to have you, General.

General KLEIN. Thank you very much, sir.

Gentlemen of the committee, I thank you for the invitation to appear before your committee today. The subject before you is a vital one. It assumes even more importance in the light of the present crisis.

My name is Julius Klein. I am a resident of Chicago. I am a retired Army officer, with the rank of major general.

It has been my privilege to serve as consultant to the late Senator Taft, of Ohio, and to the Senate Armed Forces Committee in the 80th Congress.

And later, in 1954, as you may recall, I performed a special mission in Western Europe for the Senate Appropriations Committee.

It is a matter of great pride to me that gentlemen on both sides of the aisle in the Senate and the House described this as a mission well done.

Now, I have just returned from a 2-month visit to five European countries, including some of the major member nations of the Euro-

pean Atomic Energy Community, such as West Germany, France, and Belgium.

Although I was not an official representative of the United States Government during my journey, I had the privilege of renewing my friendship with a number of high officials of these governments, as well as with several prominent officials of Euratom itself.

I wish to make it plain that I represent my own views solely in this testimony—as a retired Army officer who has tried to serve my country in a number of civilian capacities.

My interest in this question is based solely on my concern for what is in the best interests of the United States and its foreign and economic policy.

Gentlemen, I found almost unanimous opinion that the program proposed by President Eisenhower, and which is now pending before this committee, would be of great significance in the advancement of worldwide peaceful uses of atomic energy.

We need only to look at the headlines from the Middle East to understand the urgency of this legislation.

There is no doubt in my mind that, technically and commercially, the joint program will be of benefit to the United States as well as to Euratom.

My journey abroad enabled me to obtain conclusive evidence of the determination of the Soviet Union to impress the people of Europe with their industrial progress, particularly in the field of nuclear power development. This is an area that is receiving maximum Soviet attention.

As the President has said, and I quote:

> In the face of challenges to the West, this—Euratom—program offers heartening evidence of the fundamental unity of purpose for the common good which exists among the free nations of the world today and illustrates our basic desire to concentrate on harnessing the atom for peaceful purposes.

I should like to give you an example of the way in which the Soviet propaganda works.

While overseas, I attended the first World Public Relations Congress, which was held in Brussels last month. I was a delegate of the American Public Relations Association.

A delegation of three members representing the Soviet Union was seated at the opening of the Congress. This delegation promptly proceeded to use the Congress as a forum for the distribution of sinister propaganda against the United States and the rest of the free world.

Although the Congress had barred political and controversial issues from its agenda, the Soviet delegates hammered away at their favorite theme—that the United States was seeking war, whereas the Soviet was seeking only peace.

I recall that one of the Soviet delegates obtained recognition, and addressed the Congress in this fashion:

> In the Soviet Union we have 2 million workers utilizing atomic energy for peace, and, not like the United States, for war.

After a few more utterances of this type, I obtained recognition. Among other things, I pointed out that the Soviet brand of public relations was best evidenced by the events in Hungary and Poland, and in the executions of Nagy and Maleter.

And I made it quite plain that the Communist propagandists were ignoring the fact that the Eisenhower doctrine of atoms for peace, was of worldwide importance, and that they would do well to subscribe to it.

At that point, the chairman of the Congress ruled the Soviet delegates out of order, and we were able to get on with the business at hand.

I cite this incident, gentlemen, only to highlight the fact that the Soviet Union is pursuing a course of attempting to undermine all that the Western nations are seeking to accomplish in the way of world peace.

May I remind you that the Congress already has enacted legislation to share the military secrets of the atom with our friends in Great Britain, and, to a lesser extent, with France.

Now we are presented with the opportunity to share the peaceful, as well as the military, knowledge with our allies of the Western World.

Should we fail to grasp this opportunity now, the result would be to add weight to the Soviet contention that we are interested only in atoms for war, and not atoms for peace.

The Soviets aim at using their scientific and economic resources to strike at the basic institutions of the Western World's free enterprise system.

The President's atoms for peace program was a vital step in checkmating this Red design.

An equally important step was the formation of the European Atomic Energy Community.

And now comes the pending international agreement between the United States and Euratom. This proposal clearly constitutes recognition that multilateral action by the Western Community is required to safeguard the free economic system of the West in the key area of peaceful use of nuclear development.

It is unfortunate that the proposal comes late in this session of Congress, but I voice the hope of all with whom I talked that it is not too late.

It is never too late, gentlemen, to adopt measures for peace.

You will recall that when President Truman made the fateful and correct decision, as Commander in Chief, to unleash the atom bomb against Japan, and thus hasten the end of World War II, he made a fervent prayer that some day this great source of energy might be used as a blessing to the world, and not for the destruction of mankind.

The Eisenhower atoms for peace doctrine, which the Soviet propagandists have tried to ridicule from one end of the earth to the other, seeks to divert the awesome power of the atom into peaceful channels so that men, women, and children everywhere need no longer live in fear.

And now comes Euratom, an agency operated by men dedicated to peace, by men free from the taint of socialism, communism, or other "isms," under the chairmanship of the distinguished Monsieur Armand.

I have had the privilege of meetings these men, and I am impressed by their determination to make uratom work for the benefit of yuo, and me, and our fellowmen.

The member countries have assigned their most distinguished and ablest statesmen to the task of promoting peaceful uses of atomic energy.

Euratom represents a prime opportunity for United States participation in a concerted effort by the free world to preserve the basic institutions of Western free enterprise.

It affords the opportunity to demonstrate to the underdeveloped countries that Western science and technology have immense contributions to make to the peaceful development of new sovereignties.

It can help to further respect for institutions of private enterprise by demonstrating that Western aid is not trailed by the political strings that bind Soviet offers.

In my conversations abroad, I found considerable interest in the fact that the British Government has offered to conclude an agreement with Euratom. As you know, negotiations are well underway.

Prime Minister Macmillan recently was asked about these negotiations by a member of Parliament. I would like to quote his reply. He said:

> The American agreement provides the framework for the joint construction of prototype reactors of American design, which still are in the development stage and which will be partly American financed. The United Kingdom offers a fully developed power reactor system which is already available for use in this country and for export on ordinary commercial terms.
>
> Her Majesty's Government hopes to conclude agreements with the—Euratom—Community, and with appropriate member governments, which will provide the framework within which exports can take place.

In the course of my discussions, I found that there is no question but that British type power reactors are at the moment further developed than the American type. And, furthermore, I was informed that they can produce electricity at a lower rate than reactors developed in the United States.

But, at the same time, I was given to understand that Euratom holds to the view that the Community should explore the possibilities of American- as well as British-type reactors.

Euratom proposes to construct big powerplants in order to find out which type, in the long run, will prove to be the more economical.

The feeling is strong that this construction program, when linked to the joint research and development plan put forward by President Eisenhower, will provide a major incentive for European industry, for free private enterprise, which the free world needs.

And this is the nub of the program.

We must prove that the American type reactor is geared above all other types to the peaceful uses of this tremendous energy.

Obviously, Euratom will only buy reactors of this type if the nations of the Community are convinced that these reactors are economically sound. The program now before you, endeavors to carry this conviction abroad.

There are other compelling reasons, call them selfish, if you wish, why we must be closely identified with Euratom.

European nations have long been the source of many scientific developments, many of which have been of material benefit to the American people.

We, too, have contributed much in this field, but one can never be too old, or too learned, to ignore the progressive ideas of others.

As you gentlemen will remember, the whole field of atomic development was opened to us through the genius of Americans of foreign extraction, men who were refugees from their hard-pressed native lands, men of the stature of Einstein, Teller, Fermi, Szilard, and von Neumann, and others of like talents.

The President is now asking us to contribute to Euratom. But we can also learn from Euratom.

We have only to gain by this association.

Earlier I stated that there is desire, intense desire, on the part of those with whom I conferred for action on this program before the adjournment of Congress. Let me explain the reasons behind this desire.

Recent events in Europe have upset the time schedule for implementation of the European Common Market. These, in turn, could have a noticeable effect upon the progress of Euratom.

Premier De Gaulle has informed the President of the European Parliamentary Assembly that it is his intention to respect the European treaties now in force, but he has not denied his skepticism of these agreements.

The French economic situation is such that the entire Common Market faces delay in getting underway, at least in getting underway to the extent originally planned and hoped for by the member nations.

It remains now for Euratom to give proof of the vitality of European integration through the program now before the Congress.

My consultations abroad have convinced me of one vital fact: If this program should be rejected by the Congress, the result could only be to increase skepticism of United States policy and the sincerity of the Eisenhower atoms-for-peace plan within the European Community.

Rejection also would be considered generally as a sign of distrust, rightly or wrongly, and a retreat from United States policy for the unification of a free Europe bound to America in the peaceful pursuit of life.

I don't believe that it is an overstatement to say that Europe might undertake to try its hand alone, collectively or individually, politically and technically, in the event that this program should fail.

I do not pose as an expert in the field of atomic energy. U–235 is a mystery to me, as it must be to many people. I can report only the results of my conferences.

If Europe must travel alone, I am told, industry there will have no choice but to engaged in the construction of natural uranium-type reactors. Reactor technology offers limited possibilities, due to the huge costs involved.

Should European industry be committed to natural uranium-type reactors, the fewer would be the possibilities for development of American-type reactors in Europe.

My friends in Euratom have told me that they would deplore such a situation.

Also, in my discussions abroad, I found apprehension in the original proposal to grant inspection rights to the atomic energy now located in Vienna.

This, as you are well aware, would have amounted to letting the Soviets take part unilaterally in atomic control in Western Europe.

Our allies, naturally, could not accept such a plan.

It is gratifying to know that Euratom intends to keep its skirts clear of any Communist plan for mutual inspection, and that such a proposal does not appear in the program submitted to you.

Euratom has taken steps to set up its own control system under which nationals from six different nations shall have the right to investigate in other countries than their own.

That, gentlemen, is the free world's way of doing business.

By insisting upon an unrestricted control system, Euratom has done a great service to the objectives of freedom-loving peoples everywhere.

As a layman I have tried to bring you only the thoughts I assembled during my tour of Western Europe. They came to me from many sources. They came to me from men and women sincerely interested in putting the atom to work for peace.

Euratom is a step sorely needed in this period of crisis abroad. As the President has said:

> It will bolster the strength and solidarity among the free nations of the world.

I earnestly urge its approval.

Thank you.

Chairman DURHAM. Thank you very much, General. It was an excellent statement.

Senator PASTORE. I would like to applaud the general for a very excellent statement. I concur with every single word in it.

Senator ANDERSON. Could I ask just one question.

At the top of your last page you say that—

> I found apprehension in the original proposal to grant inspection rights to the Atomic Energy Agency now located in Vienna. This, as you are well aware, would have amounted to letting the Soviets take part unilaterally in atomic control in Western Europe. Our allies, naturally, could not accept such a plan.

In the proposed agreement for cooperation, article 12 says:

> In recognition of the importance of the International Atomic Energy Agency, the Government of the United States of America and the Community will consult with each other from time to time to determine whether there are any areas of responsibility with regard to safeguards and control and matters relating to health and safety in which the Agency might be asked to assist.

Is it their plan to get into the Agency as rapidly as possible? Do you think that is bad?

General KLEIN. Is the Senator referring to the International Atomic Energy Committee?

Senator ANDERSON. The International Atomic Energy Agency. It is referred to in section D, article 12, in regard to the importance of the International Atomic Energy Agency, the one you are referring to here.

Do you think it would be bad for these two?

General KLEIN. I personally believe so; yes, sir.

Representative PATTERSON. I knew General Klein in the South Pacific. I knew him as a lieutenant colonel, colonel, and a general. I have known of his work since the war and he served the United States Senate. I have known on many occasions where he has served this country.

I want to say to the general I think it is a very excellent statement. A man of the general's caliber and ability is certainly one we

can take into serious consideration. General Klein, I want to welcome you here this morning.

General KLEIN. Thank you very much, Congressman.

Senator ANDERSON. I was not being critical of you, General Klein. As you know, I have been a good friend of yours, too. I just wanted to call to your attention that article 13 starts off this way:

> The Government of the United States of America and the community reaffirm their common interest in fostering the peaceful applications of atomic energy through the International Atomic Energy Agency and intend that the results of the joint program will benefit the Agency and the nations participating in it.

General KLEIN. Senator Anderson, I am sure that the United States Government is sincere in following this article 13. But I am not sure that the Soviet Government feels the same way as our own Government.

Therefore, I take this position: Events have shown, not only a week ago, a month ago, 10 years ago, 40 years ago, where the Soviets stand. I would be very happy to be wrong in my opinion of the Soviets and, if I am, I will come back before this committee and apologize. I hope that in the next few days there may be a clearing up as to their future participation among the civilized nations.

Chairman DURHAM. You can go back further than that, General. You can even go back to the 14th century and the 100 Years' War.

General KLEIN. Mr. Chairman, I agree, and now may I refer to a memorandum which I hope may be included in here? I read in this Forum on Atomic Energy a splendid statement by Monsieur Armand. I would like to offer this as an addition to my testimony.

Chairman DURHAM. Without objection, it may be placed in the record.

Representative PATTERSON. Mr. Chairman, as part of the record of these hearings, I would like to submit the following statement which I made on Tuesday, July 29, 1958, and which appeared in the appendix of the Congressional Record:

> Mr. PATTERSON. Mr. Speaker, I had the pleasure last Thursday of renewing my friendship with a distinguished and patriotic American, Maj. Gen. Julius Klein, retired, of Chicago. The occasion was the appearance of General Klein as a witness before the Joint Committee on Atomic Energy, which is considering the international agreement between the United States and the European Atomic Energy Community.
>
> General Klein, who recently returned from a 2-month series of conferences with prominent officials in Western Europe, made a very excellent statement. It is certainly one we can take into serious consideration, and I am happy to note that the complete text appeared in the appendix of the Congressional Record of July 24. I commend it to the attention of my colleagues.
>
> Mr. Speaker, I knew General Klein in the south Pacific. I knew him as a lieutenant colonel, colonel, and a general. I have known on many occasions where he has served his country. One occasion that comes to mind was when General Klein, at his own expense, conducted a study mission in Europe as a consultant to the Committee on Appropriations of the Senate. That was in 1954, and General Klein visited England, France, the Federal Republic of Germany, the German Democratic Republic, the Saar, Austria, Italy, Belgium, Switzerland, Holland, Spain, Luxembourg, Scandinavia, and the Vatican. He talked to literally hundreds of men and women in all walks of life seeking information of value to his country. The report he later made to the Senate committee was hailed by Democrats and Republicans alike as of outstanding importance in the study of our Military Establishments and needs abroad.
>
> A man of General Klein's caliber and ability is certainly well qualified to speak to us of the vital place that Euratom occupies in the efforts of the free world to promote the peaceful uses of atomic energy.

We all have a right to be proud of the long and distinguished record of General Klein's service to our country. Army officer, leader of veterans organizations, war correspondent, editor, public-relations counsel, motion-picture executive, investigator of subversive activities in the United States, adviser to both executive and legislative branches of Government, General Klein has, indeed, given many lives to his country.

He was the youngest American war correspondent in World War I, after which he enlisted in the Army. In 1933 while the country was at peace, General Klein joined the Illinois National Guard, where he headed the investigation of subversive activities in the Middle West in 1933 and 1934. He again entered active Army service in 1941, and spent most of World War II in the south Pacific as a colonel under General MacArthur. He was twice decorated for heroism. He was separated from the Army in 1946 after serving as special assistant to the Secretary of War. Not satisfied with a well-earned period of leisure, General Klein became the commanding officer of an important unit of the Illinois National Guard. He achieved the rank of major general for his dedicated and valuable work in the National Guard since 1946. Included in his many postwar activities is his participation in the American Legion, Disabled American Veterans, AMVETS, and Jewish War Veterans (national commander).

It is no exaggeration to say that the future welfare of this country depends upon our ability to produce leaders of the caliber, integrity, and dedication to public duty of Gen. Julius Klein.

Chairman DURHAM. Are there any further questions of the General? Thank you very much, General.

General KLEIN. Thank you.

(The memorandum referred to above follows:)

BRUXELLES, *le 14 Juillet 1958.*

COMMUNAUTE EUROPEENNE DE L'ENERGIE ATOMIQUE—EURATOM

LA COMMISSION RELATIONS EXTÉRIEURES

Extrait du "Forum Memo" June 1958

QUESTIONS AND ANSWERS: AN EXCLUSIVE MEMO INTERVIEW WITH EURATOM PRESIDENT LOUIS ARMAND

(Each month the Memo interviews a leading newsmaker in the atomic energy field. This month it is Louis Armand, president of the six-nation European Atomic Energy Community with which the United States proposes to undertake a joint power reactor construction program calling for the installation of 1 million kilowatts capacity in the Euratom countries by 1963.—Editor.)

Q. The pending United States-Euratom agreement is regarded by many here as the greatest step forward the United States has taken so far toward the peaceful development of the atom in the international field. How do you foresee its effects in Europe, (*a*) techniaclly, (*b*) economically, and (*c*) politically?

A. (*a*) On the technical plane, the agreement enables us to pass directly to the realization of power stations equipped with reactors using enriched uranium and cooled by boiling or pressurized water, whereas, in our own countries, up to the present, electric power stations have been equipped only with gas-cooled natural uranium reactors. We consider this an advantage because the actual state of nuclear technology demands that we proceed in several directions at the same time. Further, we are convinced that the simultaneous use of the two techniques will improve them both.

(*b*) On the economic plane, American cooperation will accelerate realization of the first nuclear power stations in Europe and will speed up the process of equipping industry. The prospect of this agreement, following numerous visits by European industrialists to the United States, has stimulated industrial circles. On the whole, American action can catalyze the start of equipping Europe with nuclear energy.

(*c*) On the political plane, the agreement will reinforce not only European integration, but also Atlantic solidarity, and its is occurring very opportunely at the present time. This will be the first time that the United States and Europe have worked so closely together in the industrial and scientific field and I think it will be an historical example of very great importance for the future.

Q. The agreement calls for installing nuclear powerplants delivering 1 million kilowatts of electricity by 1963. In view of this, do you still regard the "Target for Euratom" objective of 15 million kilowatts by 1967 as a realistic goal?

A. The aim of the joint program is to set up in the Community by 1963 an installed nuclear capacity of about 1 million electric kilowatts in the form of reactors of tried types on which research and development has been carried to an advanced stage in the United States, and thus substantially to increase the total capacity envisaged in the framework of the programs underway in the member states. This Community capacity can be estimated at about 4,000 megawatts installed by 1965. United States cooperation will certainly increase this figure.

It is not possible to say at this time how much installed power we will have attained by 1967 under the impetus of Euratom. Probably the objective of 15 million kilowatts proposed by Messrs. Etzel, Giordani, and myself will not be attained. We proposed this objective to our Governments more than 1 year ago, but they have not yet had the opportunity to take it into consideration, thereby causing a considerable delay at the very outset. Then again, the following factors have resulted in slowing up of the nuclear effort: The financial difficulties of certain countries, confirmation of France's hopes about oil in the Sahara, and higher costs for the nuclear power stations than had been originally planned.

As for primary costs, we hope that the power stations of the joint United States-Euratom program will afford us more favorable terms, so that the final date of realization of the objectives of the "three wise men" will be retarded by only a few years.

Q. According to what we know about the pending United States-Euratom agreement, it is not clear to what extent the power utilities in Euratom countries will participate. Do you see any problems arising in connection with gaining their support and their direct financial participation? In the same vein, is there any danger that because of direct financial participation and support by Euratom and by member nations the long-range Euratom effort may become predominantly a nationalized program?

A. We believe that the program is sufficiently attractive to interest the electricity producers of the Euratom countries in participating in it. These producers know that sooner or later they will have to produce electricity from nuclear energy, even if it cannot immediately be obtained at the same cost as electricity from conventional sources, the agreement offers the means of starting nuclear energy production with the financial risks reduced and rather precisely limited.

As you know, the reactor-building program is complemented by a large research and development program. This is probably its chief advantage from the producers' point of view, even if it is a fairly long-term one. Indeed, this is what holds out the hope that investment costs, as well as fuel costs, may be considerably reduced in a few years from now. Here I should like to stress that nuclear power stations, unlike conventional power stations, can profit greatly from the technological progress that accompanies and follows their actual construction.

As regards direct financial participation by electricity producers, this raises no problem up to the level of costs equivalent to those for a conventional power station. The remainder of the costs are partly covered by a loan which would be made by the United States Government; but there will still be a certain fraction for which other finance will have to be found. While the residual capital may be raised with government aid in some of our countries, that by no means implies a socialization or nationalization of the program, any more than does Government support in the United States such as amorization facilities, tax exemption, etc.

Finally, I should like to emphasize that Euratom will not participate directly either in the building or in the financing of the power stations; that will be the task for industry, possibly assisted by the governments. Euratom will only be an intermediary, offering its good offices. As is stated, in fact, in the preamble to the memorandum of understanding: "The joint program must be conducted so as to obtain the maximum support of the industries of the Community and of the United States. Indeed, their active participation is truly indispensable to the success of the program." To sum up, Euratom and the joint program will not socialize industry but will bring it help and assistance without modifying its present structure.

Q. Under the joint program, Euratom undoubtedly will "import" a considerable amount of United States technical knowledge. Do you think that

Euratom will also import substantial amounts of nuclear power products made in the United States?

A. It seems clear that, in the framework of the program, European industrialists will import nuclear products from the United States, including fuel elements. But it is very difficult to predict the likely amounts of such imports at this stage. Besides, Euratom industrialists will remain perfectly free to import as much or as little as they wish.

Q. Among the reactors developed in the United States is there a preference in Euratom for the PWR of BWR type? Will the joint program concentrate only upon water-type reactors using enriched uranium?

A. Euratom does not have an a priori preference as between PWR or BWR reactors. It is possible that other types of reactors will also be adopted to realize the joint program.

Q. How would you compare the quality of safeguards and controls to be enforced by Euratom on the use of special nuclear material with those now in force in the United States bilateral agreements?

A. One of the Commission's first duties under the Euratom treaty is to set up an absolutely watertight control system. The Euratom control system will be the first concrete step on the road to a truly international control since it will be an effective system of mutual control—that of a multinational community with reciprocal control and surveillance. By its very existence and efficacy it will serve as an example and will favor the objectives of the International Atomic Energy Agency control system. It will be established according to the criteria which have been agreed upon between Euratom and the American Government, based on the principles of the Euratom treaty, of the IAEA, and of the bilateral agreements of the United States. In order to benefit from the United States extensive experience in this field, Euratom has asked the United States Government to help it in setting up and operating its control system. Thus the control system set up by common accord gives the United States an even stronger guaranty than they could obtain at present under any bilateral or international agreement.

Q. Do you envisage eventually a similar joint program with the United Kingdom?

A. The United Kingdom has appointed as its representative to Euratom Sir William Meiklereid, its representative to the European Coal and Steel Community, and has expressed its desire to begin discussions with Euratom with a view to a cooperation agreement. At the moment, of course, it is too early to say just what this future agreement will contain.

Q. In view of the institutional relationships Euratom enjoys with the Common Market and the Coal and Steel Community, do you plan to encourage the integration of the Euratom Commission's activities with those of the other two executive branches as a means of speeding the economic and eventual political integration of Europe?

A. There is close collaboration between the three Communities and between their executives. The proof of this can be seen in the contacts already established between the members of the High Authority of the ECSC and of the two commissions, for example, on the subject of establishing joint services, on the means of working out a joint energy policy, on joint participation in the studies, preparations, and negotiations for the free trade area project in its nuclear aspects, etc. It is still too early to work out in definitive form all the details of this cooperation and common action, which will vary according to the various ends and means in question. But we too are convinced that the three European Communities must not be isolated one alongside the other, but that they must blend one day into the European Community.

Chairman DURHAM. Yes, there were some questions raised in the hearing that involved the Board of the Export-Import Bank. I understand that Mr. Stambaugh is here this morning, vice chairman.

Mr. Stambaught, will you come around, please? There was a question raised by some Member of the Congress.

STATEMENT OF LYNN U. STAMBAUGH, FIRST VICE PRESIDENT AND VICE CHAIRMAN, BOARD OF DIRECTORS, EXPORT-IMPORT BANK OF WASHINGTON

Mr. STAMBAUGH. My name is Stambaugh. I am the first Vice President and Vice Chairman of the Board of Directors of the Export-Import Bank of Washington.

Chairman DURHAM. Do you have a statement, Mr. Stambaugh, or do you prefer to be asked questions?

Mr. STAMBAUGH. Might I say a preliminary word?

We were informed yesterday that some questions had been raised in the committe with regard to the proposed Export-Import Bank loan as an integral part of the scheme for financing the Euratom project.

I want the committee to understand that up to now only preliminary conversations have been had by the bank with representatives of Euratom.

Chairman DURHAM. Are you at liberty to state those to the committee in open session?

Mr. STAMBAUGH. I do not know of anything that cannot be stated in open session.

The point is, however, that the conditions of such a transaction have not been negotiated, or been determined.

The requirements that the bank may impose to make sure of the security of the credit, to make sure of its repayment, those things have not been negotiated.

Chairman DURHAM. But you do have a request for a loan by Euratom; is that correct?

Mr. STAMBAUGH. I did not quite hear what you said, Mr. Chairman.

Chairman DURHAM. You do have before you a proposal, or request, for a loan from Euratom; is that correct?

Mr. STAMBAUGH. Technically, that is not correct. We have been consulted by the other interested agencies of the United States Government with regard to whether or not we will be willing to consider a request for such a loan.

I would assume that that request could not possibly be formalized until the Euratom international agreements have been ratified.

Chairman DURHAM. Where did that request come from? What agency of the Government? The State Department?

Mr. STAMBAUGH. It came in the form of a meeting that was held at the Export-Import Bank with Mr. Cook, Mr. Kohmstamm, of Euratom, and Mr. Douglas Dillon, the Under Secretary of State.

Chairman DURHAM. It came from two agencies, the AEC and the State Department?

Mr. STAMBAUGH. There were others there, I don't remember who they were.

Chairman DURHAM. On what date was that meeting held, Mr. Stambaugh?

Mr. STAMBAUGH. May I say that it was probably about a year ago? Is that about right, Mr. Cook?

Mr. COOK. The one a year ago had to do with financing fuel inventories in general. This time it was in early May.

Mr. STAMBAUGH. In May of this year, I am informed by Mr. Cook.

Senator ANDERSON. Do I understand it was not regarded as of sufficient importance to make a record of it?

Mr. STAMBAUGH. I think we have a record of it. I just do not locate it readily in this file.

Senator ANDERSON. You knew you were going to talk about this today? They did not mislead you. You knew you were going to talk about this today?

Mr. STAMBAUGH. Yes, sir.

Senator ANDERSON. They gave you everything pertinent that they had?

Mr. STAMBAUGH. They gave me the file.

Senator ANDERSON. And the file does not reveal that any meeting took place?

Mr. STAMBAUGH. Well, just give me a little more time, sir.

Senator ANDERSON. I will be happy to.

Mr. STAMBAUGH. Now I find it. On May 20.

Chairman DURHAM. What year?

Mr. STAMBAUGH. 1958.

Chairman DURHAM. I think we wanted to know the date when the negotiations began, because the financial end of this picture is important.

Mr. STAMBAUGH. If I may be permitted to correct the chairman, negotiations have not begun for a credit from the Export-Import Bank.

Chairman DURHAM. I understood that negotiations had begun, because they had looked at what point they were going to finance it by the interested parties of the Government. It could not take place, of course, until some procedures were developed as to where they were going to get the money from. Now, who raised a question yesterday about it?

Senator ANDERSON. I did. I tried to find out if a commitment had been made.

Mr. STAMBAUGH. You would like to know if the Export-Import Bank has made a commitment?

Senator ANDERSON. Yes. When you try to arrange financing for a structure, you ordinarily find out if the people who are going to put up the money will commit themselves to a contract. You say they have not even negotiated?

Mr. STAMBAUGH. The answer to that question is, I think, clear. The Export-Import Bank has committed itself to the other interested agencies of the United States Government and to Euratom to consider a long-term loan of the type that was referred to by the President in his message to the Congress, a long-term loan up to $135 million. The term has not been determined, has not been negotiated.

We did have some considerable discussion of interest rates, and finally agreed that, if and when such a loan is made, it will be at a rate of 4½ percent per annum. That is the extent of the commitment to make such a loan or consider such a loan as an integral part of the entire scheme for financing this project. In other words, we are committed to the same extent that the other parties are committed.

Senator ANDERSON. You used two terms in there that are quite different. You said, "To make such a loan," and then "consider such a loan."

Mr. STAMBAUGH. To consider such a loan.

Senator ANDERSON. You mean to consider such a loan?

Mr. STAMBAUGH. I meant to consider; that is right.

Senator ANDERSON. Now, the capital costs are set forth here in the appendix. You say:

> Up to $135 million to be provided by the United States Government to Euratom in the form of a long-term line of credit on terms and conditions to be agreed, such funds to be relent by Euratom for the construction of facilities under this program.

You have only agreed upon one form. When you consider it, it will be at a rate of 4½ percent.

Mr. STAMBAUGH. That is the only term of the proposed loan that, you might say, is fixed at this time.

Senator ANDERSON. Have you discussed, definitely, the number of years that the loan will run?

Mr. STAMBAUGH. We have not determined what the terms will be.

Senator ANDERSON. There has been no discussion as to the number of years?

Mr. STAMBAUGH. There may have been. I don't recall that, definitely.

Senator ANDERSON. Has there been any discussion as to the security you will have?

Mr. STAMBAUGH. It was represented to us——

Senator ANDERSON. Who represented it to you?

Mr. STAMBAUGH. Mr. Kohmstamm. Is that his name?

Senator ANDERSON. Yes, sir; from Euratom.

Mr. STAMBAUGH. From the Euratom governments, that the full faith and credit of the six governments will be behind this loan. Further than that, how that will be implemented, we do not know yet. Further than that, we have not negotiated anything in the field of security.

Senator ANDERSON. If they are the applicants for the loan, it would be up to them. They have to get the pledge of the full faith and credit of their governments before you would make the loan?

Mr. STAMBAUGH. That is nothing new for us. In every project loan, we have to make sure that the money that is to be provided by the borrower is in sight before they can use any of our funds.

Senator ANDERSON. That is a different subject that I will be glad to get to in just a moment. You say the money provided by the borrower has to be in sight? There are 2 parts of this, of the $350 million; there is $135 million, which your bank is expected to lend, and then $65 million in the open market, and then $150 million they are going to borrow from somebody else. Now, we will get to that. Your statement is that they are going to have to show you that money before you start making your loan?

Mr. STAMBAUGH. We are going to have to be satisfied that that money is available, that that money will be provided.

Chairman DURHAM. Will the Senator yield?

Senator ANDERSON. Yes.

Chairman DURHAM. I believe the terms, conditions, duration, nature, and scope of the Corporation is defined in the law. Do you not think this is a part of the agreement that should be definitely defined, as to how it is going to be financed, as a good banker?

Mr. STAMBAUGH. Did I understand you to say, Mr. Chairman——

Chairman DURHAM. This agreement has been signed at the present time. It has already been signed; you understand that?

Mr. STAMBAUGH. The Euratom agreement?

Chairman DURHAM. That is right.

Mr. STAMBAUGH. Yes; certainly. Certainly, no agreement has been signed by the Export-Import Bank for a loan.

Chairman DURHAM. The financing of it is so indefinite at the present time, according to your statement, because you have just been talking about it only since May 20, and, under the law, the terms and conditions and everything are very well defined in the act.

Mr. STAMBAUGH. The terms and conditions of the loan are not defined.

Chairman DURHAM. Section 123, policies contained in the international arrangements. I do not know whether you have read the law.

Mr. STAMBAUGH. I certainly have. The terms and conditions of the loan are not stated in the law.

Chairman DURHAM. Do you not think this is a part of the agreement that should be definitely defined; the financing of it?

Mr. STAMBAUGH. I do not think so. I think it would be a little bit untimely for us to start negotiating for a loan to Euratom before this agreement becomes effective.

Chairman DURHAM. I am not speaking about that. I am thinking of the part you are going to play in this thing.

The Export-Import Bank is going to have to make this loan. You have already agreed on the interest rate. So you really have some of it, you have agreed on that part of it.

Now, the other conditions, it seems to me, should be defined in the agreement, how long and everything else. How long are you going to make the loan?

Mr. STAMBAUGH. We are just suggesting something that would not be possible because this is in the nature, Mr. Chairman, of a line of credit and a great deal has to be done after that line of credit is established about entering into a credit agreement and we have to be provided with a great deal of data and a great deal of information before we can determine what the terms will be under that line of credit.

Chairman DURHAM. Do you feel the agreement, under the agreement which we have already signed, you are bound as a Government agency to make this loan?

Mr. STAMBAUGH. If all of the terms of the agreement are met, I think we are committed to make the loan.

Chairman DURHAM. Then they should be defined in the agreement, and they are not.

Mr. STAMBAUGH. If all the terms of the Euratom agreement are met, I say, then I think we are committed to make the loan.

Senator ANDERSON. You are committed to make a loan without consideration of the security?

Mr. STAMBAUGH. No; under no circumstances.

Senator ANDERSON. Has this matter been presented to the Board of Directors of the Export-Import Bank for any action whatever?

Mr. STAMBAUGH. No, sir.

Senator ANDERSON. Then how can you say you are committed in the absence of a ruling by the Board of Directors?

Mr. STAMBAUGH. I say that we are committed in the sense that as a result of this meeting that we held on May 20 which was attended by Euratom, the State Department, and the Atomic Energy Commission, and as a result of our having told the interested agencies of our own Government that we would be willing to consider such a credit——

Senator ANDERSON. Mr. Stambaugh, did you not in effect say to them if they could bring up a good piece of paper that had property security behind it, you would be glad to consider it on a long-term basis at 4½ percent interest? Did you go further than that?

Mr. STAMBAUGH. No.

Senator ANDERSON. If you did not go further than that, then you are going to have to examine the security?

Mr. STAMBAUGH. Yes; indeed. We are going to have to know that it is a sound loan before we will release any of our money.

Senator ANDERSON. As I understand it, they will have to pledge the full faith and credit of these countries before they can get the loan?

Mr. STAMBAUGH. I said it was represented to us that the full faith and credit of the Euratom countries will be behind these loans,. We have gone no further in determining what we will require in the way of securities for the loan.

Senator ANDERSON. I will alter my question; I do remember that is exactly the way you said it and not the way I said it.

You did say it was represented by Mr. Kohmstamm that the full faith and credit of these countries will be pledged. Therefore, I would assume if the full faith and credit of these countries is not pledged, you would not be committed?

Mr. STAMBAUGH. We would not.

Senator ANDERSON. Now, section 123 of the Atomic Energy law—maybe the Atomic Energy Commission would like to comment on this—in dealing with cooperation with other nations, it says:

> No cooperation with any nation or regional defense organization pursuant to sections 54, 57, 64, 82, 103, 104, or 144 shall be undertaken until:
>
> A. The Commission or, in the case of those agreements for cooperation arranged pursuant to section 144 (b) the Department of Defense has submitted to the President the proposed agreement for cooperation, together with its recommendation thereon which proposed agreement shall include:
>
> 1. The terms, conditions, durations, nature, and scope of the cooperation.

Now, if it involves $135 million and only the interest agreed upon the matter is not proper before this Commission, is it, because you do not tell us anything about the duration and the people who are going to furnish the money have not even presented it.

What would your comment be on that, Mr. Floberg?

Mr. FLOBERG. I think my response to that, Senator, is that the agreement for cooperation will be officially submitted to the President at the appropriate time and that it does include the terms, conditions, duration, nature, and scope of the cooperation. One of the terms of the cooperation is that financing will be arranged; the statute does not require the terms, conditions, and so forth, of the financing of that cooperation to be submitted at this time.

Now, it includes a general description of the financial arrangement, too.

Senator ANDERSON. I thought the deal for cooperation was in front of us.

Mr. FLOBERG. Unofficially, that is correct.

Senator ANDERSON. Does it contain anything about this?

Mr. FLOBERG. It cannot be before you. This is for your convenience that it is here. You are considering this as a part of the package in order to help the committee.

Senator ANDERSON. Has it not been initialed?

Mr. FLOBERG. Yes, sir.

Senator ANDERSON. Well, there is something before us.

Mr. FLOBERG. Well, in a parliamentary sense, I don't think it is before you, but in a consideration sense we certainly intended it to be before you; yes, sir.

Senator ANDERSON. You are asking us to waive the 30-day period under the agreement for cooperation as soon as the law goes through?

Mr. FLOBERG. When the law goes through; that is correct, sir.

Senator ANDERSON. You shake your head back there and he nods his head this way. It is a little confusing.

Will you tell us why you are not asking it? Can you not say it out loud?

STATEMENT OF HERBERT E. HOFFMAN, OFFICE OF GENERAL COUNSEL, ATOMIC ENERGY COMMISSION

Mr. HOFFMAN. I am with the Office of the General Counsel.

The agreement before you is an initialed agreement. Once the 124 agreement has been acted upon by the Congress the initial agreement will then be submitted to the President in line with the procedure which you just read.

Senator ANDERSON. Is it not expected that the President will in turn submit it to us?

Mr. HOFFMAN. Yes, sir.

Representative HOLIFIELD. I am glad to clear this up because I did not consider that the agreement for cooperation was before us in the sense of the terms and conditions. I considered that that would come before us later for additional consideration. Am I wrong in that?

I thought this was the international agreement between the United States and Euratom we are asking to approve now.

Mr. FLOBERG. That is the first step in the orderly presentation of this problem; yes, sir.

That is parliamentarywise the only thing that is really before the committee.

However, that it a relatively sterile document without the accompanying document. All these documents are submitted to you as a package so that you will know what the international arrangement has behind it.

Representative HOLIFIELD. Are all the terms and conditions in the agreement for cooperation at the present time before us?

Mr. FLOBERG. All the terms that have been discussed are before you; yes, sir.

Representative HOLIFIELD. But you do not have an agreement, a complete agreement for cooperation?

Mr. FLOBERG. Let me answer that this way. This seems to me to be an extremely orthodox manner of presenting a transaction to our board of directors, the Congress.

What we are trying to get from the Congress is the authorization, by resolution from the Congress in the form of law, to proceed with the negotiations of this transaction on the basis that is being outlined to you in both the formal and informal documents that are being submitted to you.

I cannot conceive of a more orderly way to present a construction project to a board by us, the executives, who are authorized to act by you, the board.

Chairman DURHAM. As it stands today, of course, the document cannot be changed without the parliaments of those countries involved in Euratom going back to their governments and making the changes?

Mr. FLOBERG. That is correct.

Chairman DURHAM. They have accepted it. It is before us to accept it.

Mr. FLOBERG. That is correct.

There is nothing unorthodox about that, either.

Representative HOLIFIELD. It am not suggesting it is unorthodox.

In other words, there will be no future consideration by this committee of the terms and conditions, the specific terms and conditions, many of which have not yet been arrived at in the agreement for cooperation? It does not lie before us for 30 days, it does not come up as would a new bilateral cooperation agreement.

Senator PASTORE. Yes, it will. I think we are getting this confused. It is very, very simple.

The only thing that is rightfully before us now and has any legal standing before the committee now, is this international arrangement that comes to us under 124.

You have negotiated the whole matter with these other governments and later on under the law you are supposed to bring up your agreement for cooperation.

Now, in order to inform the committee as to how far you have gone, for our convenience you have submitted to us these papers, not for action at this time, but only until you have formally submitted it under the law, under 123.

You have set up here all the terms and conditions of what will be in the agreements for cooperation.

But we are not considering that now. You would still have the authority to go back and change it.

And we would have the authority to make suggestions to you that you would either accept or not accept, as you please, but we are not formally considering the agreement for cooperation. We are merely considering the procedure under 124, from which the agreement for cooperation later on will follow.

But that has to be formally submitted.

The President has to send it up here with all the refinements provided by law and we can keep it here for 30 days, either rejecting it by introducing a bill to do so, or we can do nothing about it and after 30 days it becomes a consummated agreement.

Mr. FLOBERG. That is my understanding.

Representative HOLIFIELD. That is exactly my understanding, but from some of the questions and answers here, I thought that the inference was made that we were passing on the whole thing.

Senator PASTORE. No, we are not. They can go back and renegotiate a whole new agreement after we pass on the procedure under 124, and later on come up under 123.

I don't think they will do it. I do not think they intend to do it.

But we are not considering that document now. That document is only here to make us understand how far you have gone in committing yourselves.

Mr. FLOBERG. I agree with you.

Mr. RAMEY. I think there is one further thing, though. I think the purport of these last questions was that if the Commission comes up with the agreement for cooperation the way it has been submitted for the information of the committee, there may be some doubt as to whether it is complying with section 123 of the act that says that the agreement for cooperation must contain the terms, conditions, duration, nature, and scope of the cooperation, because the agreement for cooperation has so many terms and conditions left yet to be negotiated.

Chairman DURHAM. That is the point I raised.

Mr. FLOBERG. My response to that question is that I believe it does satisfy the provisions of section 123.

Senator ANDERSON. Where it says they must be agreed upon showing the duration and all that, that you can send up one without duration that fully complies?

Mr. FLOBERG. Let me state my position again.

I believe that the draft agreement for cooperation has the terms, conditions, and so forth——

Senator ANDERSON. Duration, do not leave that out.

Mr. FLOBERG. And duration, in sufficient description to satisfy the requirements of the statute.

If you disagree with me on that, you disagree with me.

Senator PASTORE. I think what Mr. Ramey is aiming at, and I respectfully disagree with him, Mr. Ramey feels that an integral part of your agreement for cooperation is the position that the Export-Import Bank will take as to under what terms they will lend this money.

I do not think that is an integral part of the agreement. The part of the agreement that is so important so far as the Export-Import Bank is concerned is the fact that that bank will lend the $135 million to Euratom.

Now, under what conditions they do it, that is a function for the bank itself to determine.

I think that they cannot lend that money without the full faith and credit of the nations that will receive the benefit of this money, but that is a responsibility that they will have to assume with Euratom. That is not an integral part of the terms and conditions under 123.

Mr. FLOBERG. That is my point exactly, Senator.

Senator ANDERSON. That being true, you say the bank has not considered this. The duration, then, of the loan, has never been presented by you officially to the Board of Directors?

Who from the Export-Import Bank was present at this meeting with Mr. Cook, who is an employee of the Atomic Energy Commission?

Mr. STAMBAUGH. All of the Board that were present in the country at that time, Senator, I am quite sure.

Mr. Waugh, Chairman; myself, Mr. Arey, member of the Board; Mr. Brand, member of the Board; Mr. Sauer, Executive Vice President, who is with me today; Mr. Lynch of our Economics Division.

Apparently Mr. Blowers, the fifth member of the Board, was out of the country somewhere at that time.

Senator ANDERSON. Now, I am reading from the top of page 23:

> Up to $135 million to be provided by the Government of the United States of America to the Community in the form of long-term line of credit on terms and conditions to be agreed, such funds to be re-lent by the Community for the construction of facilities under this program.

If the Community is going to take this money and relend it to a private utility in Europe, would the Export-Import Bank have a right to accept only the empty note of the Euratom Community, or would it have to look to a mortgage upon these properties?

Mr. STAMBAUGH. That again is something that has not been negotiated. It comes under the heading of implementation of the loan and the assurance of repayment of the loan that the bank will insist upon.

I can only answer that by saying that we can assure the committee that the loan will be a loan with reasonable assurance of repayment if we make it.

Senator ANDERSON. Did anybody discuss with you who would sign the note?

Mr. STAMBAUGH. No—you mean representing Euratom?

Senator ANDERSON. Well, you are going to lend $135 million which is quite a little money. If you are going to lend it you must know who is going to be the borrower.

Mr. STAMBAUGH. Euratom, I understand. That is what is contemplated.

Senator ANDERSON. Who from Euratom is going to sign it?

Mr. STAMBAUGH. We don't know that yet, but we will be satisfied that he has authority to sign when we take his signature.

Senator ANDERSON. When they discussed this matter with you and you partly committed yourselves to consider it, did they describe to you who would sign?

Mr. STAMBAUGH. No.

Senator ANDERSON. Did they take the treaty establishing the European Atomic Energy Community and point to any language in it authorizing anybody to sign?

Mr. STAMBAUGH. No; we did not get into that at all, Senator.

Senator ANDERSON. Ordinarily when you lend money do you not ask what authority the man borrows it?

Mr. STAMBAUGH. Yes; when we get to the point of lending the money, we do.

Senator ANDERSON. Therefore, you are not to the point of lending money?

Mr. STAMBAUGH. No. We not only require evidence of the authority of the signer of the obligation, but we require legal opinions that his authority is legal.

Senator ANDERSON. Now, would it be safe to say to the Congress that there is no promise, expressed or implied, that you are going to make a loan, but only that you would consider it, consider the loan, that you do not know how long it is going to be; you do not know

what security you are going to have; you do not know who is going to sign it, but you do know $135 million will be made available if all proper conditions are made?

Mr. STAMBAUGH. That is a fair statement if I may amend it to state it in the inverse, that we are not going to make a loan unless it is a good loan, and we are not going to make a loan unless it is signed by somebody with authority to sign it.

We are going to determine to whom the loan will be made and that entity has authority to borrow it.

Senator ANDERSON. How did you decide on the interest rate when you knew nothing about security? Is there not ordinarily a relationship between interest rate and the risk of the loan?

Mr. STAMBAUGH. No, sir; no.

Senator ANDERSON. You do not? You mean to say you will take any financing for a shaking oil enterprise would be at the same rate of interest at which an American Telephone & Telegraph bond would be sold?

Mr. STAMBAUGH. I do not. We are talking about financing in the international field now.

About the only factor you would have to determine the rate of interest on a loan of this nature is the average cost of money to the United States Government plus X amount.

Senator ANDERSON. Is that the ordinary rule? Do all your loans take the rate of interest that covers the cost to the United States Government plus some X amount for handling it?

Mr. STAMBAUGH. That is right. Interest rates do vary as between a loan of this nature which has a large element of United States Government policy involved.

And a loan to finance a single export to a buyer abroad.

Senator PASTORE. May I ask a question of Mr. Floberg on this point?

Let us assume that we enacted the legislation before us under 124 and, because we enacted that, later on the President sent up formally the agreement for cooperation and the 30 days expired without the Congress doing anything to repudiate the agreement whereby the agreement would become a consummated agreement.

Later on Euratom could not negotiate the loan with the Export-Import Bank.

Do you get my hypothetical question?

Mr. FLOBERG. I believe I do.

Senator PASTORE. What would be the responsibility of the United States under the agreement for cooperation at that time? What would be our liability?

In other words, if the Export-Import Bank could not get together with the Euratom would we be responsible in any way under the agreement for cooperation, or would we be absolved completely?

Mr. FLOBERG. I have not given that question the thorough and deliberate consideration I would like to before answering it, but my impression is that we would have no obligation at all. (See letter, p. 247.)

Before I am committed to that, I would like to give it some further thought.

Senator PASTORE. I would like to put it in the record because we are making this loan such an important element here and the ques-

tion arises if they could not negotiate this loan, thereby raising the money that is required, the $215 million that they are going to provide and the $135 million that they are going to borrow, an aggregate of $350 million, then would we be absolved under all the conditions in the agreement for cooperation?

Mr. FLOBERG. My answer is that the deal would be off, but I would like to consider it further. I have not given this careful study.

Senator ANDERSON. I wrote into the record the other day I disagree with you because there is nothing in the articles for agreement that says you have to get this money from the Export-Import Bank.

Once you sign it, it says up to $135 million to be provided by the Government of the United States of America.

Now, if we cannot get it from the Export-Import Bank, we have to get it out of the Treasury.

Mr. FLOBERG. Well, it is not available any place else that I know of.

Senator ANDERSON. We have committed ourselves. We do not say anything here that this is contingent upon the Export-Import Bank.

Mr. FLOBERG. No. The working papers make it clear what the intent is, however, Senator.

Senator ANDERSON. Will you point to that section of the working papers which says that the Export-Import Bank has to do with this. We are absolved if it does not.

Mr. FLOBERG. It does not say we are absolved.

Senator ANDERSON. The working papers do not even touch that point, do they? If they do, I do not remember it from reading them through.

I think we commit ourselves to put up $135 million. If the Export-Import Bank does not do that, we go to the banking fraternity in New York, London, Tokyo, someplace else. If we do not get it there, we have to put in an appropriation for $135 million. We have to put up the $135 million.

Mr. FLOBERG. We will make it perfectly clear that the Export-Import Bank is the agency we have in mind. I believe the President's forwarding letter so states and I am stating to you this is our intention. We will make it perfectly clear to Euratom that this is our intention.

I believe it has already been so demonstrated. If you want any further assurance, we will tell Euratom that we have not considered any other source of funds within the United States. We will tell them that, too, if we have not already done so.

Senator ANDERSON. All I can say is that Euratom can come back to you and say, "It does not make any difference, you promised to put up $135 million. Now you produce the money."

And we will have to do it or repudiate our solemn word to which the signature of the Secretary of State has been appended.

Mr. FLOBERG. It is perfectly clear, Senator, under the terms of the agreement that if money is going to come from any other source, like all other parts of this transaction, it must be authorized by the Congress of the United States.

We all understand that. Euratom understands that. There is a very simple concept that you, the Congress, have it in your power to authorize or not to authorize the extension of this line of credit.

Now, the Export-Import Bank has general authority granted by Congress to residually do so, but no place else has it that I know of.

Before it can be done the Congress will have to exercise its authority in that respect.

Senator ANDERSON. Can I read from the President's statement of June 23, 1958, when he submitted this to Congress. He says:

> The United States through the Export-Import Bank is prepared to supplement these funds by making available to the new Communiy a long-term line of credit.

I do not see anything in there that says they have to come up with good security, bad security, or anything else. He says:

> We are prepared to supplement these funds.

Mr. FLOBERG. That certainly goes without saying, Senator. It would to me.

Senator PASTORE. Why does it? I do not think you can say that. The question is very important here. It is the crux of the case.

What is the obligation of the United States with reference to the $135 million? Is this something to be negotiated between Euratom and the Export-Import Bank whereby the Export-Import Bank can use its own discretion as to whether or not they have good security and thereby either make or not make the loan, or is this a compulsion on the part of the United States Government that we have to produce the $135 million in one fashion or another, regardless of what relationship may be later on.

How are we bound here? I think it is a very simple question.

Mr. FLOBERG. Yes; no matter what the answer to your question is, there is no obligation to furnish money on unsound terms, terms unsound to the United States.

Senator PASTORE. Who is going to determine that? If you are bound we cannot raise the question. If we are obligated to raise $135 million we cannot later on say we do not like the terms. They will have as much right to dispute us as we will them.

This is the point I am making. If the Export-Import Bank is a free agent irrespective of this agreement for cooperation whereby it is in a position of insisting upon good collateral without any obligation on the part of the United States Government, then I think you have a good point.

On the other hand, if under this arrangement we are already committed that we will provide the money through the Export-Import Bank, because, after all, the Export-Import Bank is sustained by American taxpayers' dollars, it is still our money—now, if we have obligated ourselves that we will produce this money, I think it will be too late to raise the question then that we want the full faith and credit of the Government.

We ought to raise the question now.

Mr. FLOBERG. We will raise the question now if you want to, but I don't think it will be too late. I will tell you why it is not too late:

It is the same as if I established a line of credit with the Chase Bank for a commercial client and pay a commitment fee for that money. Suppose it is for $200 million. Suppose it is to run for a period of years. The Chase Bank won't give me one penny even though they are committed to do so until a takedown is negotiated with appropriate terms and conditions.

Senator PASTORE. I am talking about the responsibility of the United States Government under this agreement for cooperation. Are

we committed to produce the $135 million even if you cannot get it out of the Export-Import Bank? That is the question here.

Have we committed ourselves that we will produce the $135 million even if they cannot get it from the Export-Import Bank?

Mr. FLOBERG. Subject to authorization by the Congress and appropriate terms.

Senator BRICKER. This agreement becomes an authorization just as soon as it is agreed to.

Senator PASTORE. That is the point. If we obligate ourselves as a nation by this international agreement there is a moral and legal obligation on our part to comply.

America does not look upon its obligations too lightly. If we are committing ourselves by this agreement for cooperation, I think it will be foolhardy later on to say it is up to the Congress because the Congress is passing this agreement and the Congress is making this agreement possible.

Therefore, we become bound by it and we cannot renege later on.

Mr. FLOBERG. The whole thing states——

Senator ANDERSON. Senator Bricker has pointed out once a treaty is entered into it becomes the law of the land.

Senator BRICKER. That is the situation. It becomes the obligation of the Government.

Mr. FLOBERG. Supposing that Euratom said we won't pay any interest, do you think we would be obliged to furnish the money under those conditions?

You say that this becomes an authorization; suppose that Euratom said, "Now, we want the $135 million and we are not going to pay you any interest," do you think we would be under an obligation to pay the money?

Senator PASTORE. No, because you have already mentioned 4½ percent.

Senator BRICKER. Of course, you might have to have an appropriation. There might be a question before Senator Dworshak's committee.

Senator ANDERSON. Among the guaranties, chapter IV, page 37, shows among the guaranties, (b):

> Up to $135 million to be provided by the United States and Euratom in the form of a long-term line of credit under terms and conditions to be agreed, such funds to be re-lent by Euratom for the construction of facilities under this program.

That is what the agreement is. There is not a word about the Export-Import Bank.

Senator PASTORE. May I make a very simple suggestion. Could we not get a statement from Euratom to the effect that it is contemplated and intended by them as well as us that the full faith and credit of the individual governments will be pledged on the loan of $135 million? It is a very simple thing. All they have to do is put it in writing and we can dispose of all those controversies.

That is how simple it all is. The only question is unless you have an understanding in advance, I think it would be foolhardy to raise the question later on. It would not be fair to them; it would not be fair to us.

All you have to do is get a letter from Euratom to the effect that they understand the $135 million will receive the full faith and

credit of the individual countries if the loan is made and that resolves the whole issue.

Mr. FLOBERG. Let us endeavor to do that. Let me read one paragraph to you that I believe answers this question from the top of page 23 of the committee print. It says:

Up to $135 million provided by the Government of the United States of America to the Community in the form of a long-term line of credit on terms and conditions to be agreed.

Now, I believe that that covers it. We are telling you, Senator, that we are not going to make any unsound terms and conditions to the extent that we participate in the transaction.

Senator ANDERSON. Mr. Cook maybe can tell us whether in the discussions of the treaty the question of pledging the full faith and credit of these countries came up.

It did, did it not?

STATEMENT OF RICHARD W. COOK, DEPUTY GENERAL MANAGER, ATOMIC ENERGY COMMISSION

Mr. COOK. It came up in the discussions. That was the statement of Mr. Kohmstamm at the time we discussed it with him before the Export-Import Bank.

Senator ANDERSON. It came up to the group they negotiated with and they rejected the full faith and credit; did they not?

Mr. COOK. No, sir.

Senator ANDERSON. There was never any discussion of pledging the full faith and credit of the country?

Mr. COOK. Your first question asked me whether or not it was ever discussed. I recall it being discussed at the time Mr. Kohmstamm appeared before the Export-Import Bank with representatives of the Atomic Energy Commission and State. I have no knowledge, or do not recall that this statement was ever withdrawn.

Senator ANDERSON. Are we to understand that during the entire negotiations there was never a time when any one of the countries, participants in this, agreed they would pledge the full faith and credit of their country?

The only time you heard it discussed was when Mr. Kohmstamm who is not a representative of any one of the individual countries made it?

There then, are we to understand that no person representing a country has ever pledged the full faith and credit toward this?

Mr. COOK. Mr. Kohmstamm, representing the Commission, in his discussions before us and before the Export-Import Bank, was speaking for the Euratom Commission, who represented the member states of the European Atomic Energy Commission.

Senator ANDERSON. And no representative official of any one of these countries has ever made that statement?

Mr. COOK. I have not talked to representatives of the countries other than Mr. Kohmstamm, his staff, or the Commissioners themselves.

Senator BRICKER. Under the terms of this agreement it is perfectly clear that the Export-Import Bank could insist upon such a guaranty, but I am doubtful whether or not the Government itself, if it had to make the arrangement in some other way to put up the money, could

insist upon such a pledge of credit by the individual members of Euratom before the money was forthcoming.

Mr. FLOBERG. Would it be helpful to ask Mr. Metzger, who participated actively in the discussions and negotiations of the financial terms, to comment on this?

STATEMENT OF STANLEY D. METZGER, ASSISTANT LEGAL ADVISER FOR ECONOMIC AFFAIRS, DEPARTMENT OF STATE

Mr. METZGER. In answer to both your question and Senator Bricker's question, the question of the pledging of the full faith and credit of the member countries in addition to Euratom pledging its own full faith and credit, was the subject of discussion.

Senator ANDERSON. I am glad to hear that.

Mr. METZGER. I tried to make that clear yesterday.

If you will turn to page 48 of the print before you, you will see the way that discussion went. That is a question which is not resolved and will be a subject for further discussion in the loan negotiations, because on page 48 in the working paper, No. VII, which deals with the subject of financing the capital costs, the first full paragraph on page 48 points out that—

> * * * the unconditional commitment of repayment of principal and interest by the Community was buttressed by the unconditional obligation undertaken by the six member countries in the treaty, to provide the funds necessary to balance the budgets of the Community, including its investment budget.

They further said:

> Since a loan to the Community from the United States constitutes a budgetary commitment approved by the Council of Ministers, the full faith and credit of the Community is supplemented by treaty obligations of the member countries to furnish the necessary resources in proportions specified in the treaty.
>
> On the other hand, it was pointed out that the Community had no perennial resource other than that to be provided by member countries to support the budgets and no power to levy to secure such resources, and that the obligation of member countries ran to the Community but not to lenders to the Community.

The issue that lies at the bottom of this discussion is, Was this a question to which you addressed yourselves?

Namely, would the member countries' obligations run through the Community to the United States as lenders, or would it merely buttress the obligation of the Community, which would be the only thing to run to the United States?

That question was clearly identified as a question, and not resolved, and it will be a question to be resolved in the loan negotiations.

Senator ANDERSON. Then the answer to what Senator Pastore is talking about is that it is not simply to get these countries to pledge their full faith and credit; they were asked to; they objected to it all the way through. When did this discussion take place?

Mr. METZGER. The agreement here is—I won't say they refused; they pointed out that they would rather not; that they would rather have their own obligation running to the United States as a Community obligation and have us satisfied with that, rather than for us to insist upon their member countries' obligations running directly to us. We were not fully satisfied with their position, and they were not fully satisfied with ours, and it is an open question right now.

Senator ANDERSON. It is an open question, but you understand what it means. It means they have set up a holding company and they are

not obligated to pay the original lender of money anything. They have an obligation as a holding company. They do not want to put up any money; the holding company has on assets because it is going to relend its money to somebody else. It has no assets now and therefore, it can successfully avoid the payment of the obligation due as countries.

Mr. METZGER. I think the problem, from this point of view, is this——

Senator ANDERSON. Was what I said the stumbling block on which it finally broke up, and you could not reach an agreement? It was if you lend a piece of money to the XYZ corporation that three of us are going to organize, whether the stockholders of that company are going to owe you anything afterward, and they reach the decision that they have a sort of incorporation with no stockholders' liability. Isn't that about it?

Mr. METZGER. Senator, that is partly right. Let me add one further thing to get this in perspective. At the bottom of their reluctance up to now—and this was not a loan negotiation; this was exploring the metes and bounds for later discussion in negotiations and to try to get as much common ground as possible, knowing there would have to be a number of things that would have to be negotiated out pretty hard—what lies at the bottom of their reluctance to have the member states' obligation run direct to the United States rather than merely buttress the Community's obligation of the United States is political, as I understand it. What they are concerned about is that they have set up a Euratom which has some supranational characteristics and some that are not. And they are concerned that, if they are required to pledge the full faith of the member states directly to the United States, that would tend to degrade the dignity of Euratom, politically, in Europe.

They are afraid, if we insist on going behind Euratom to get at the member countries, that the member countries will look at them and say, "Well, you are not very much of an entity; you are just a cover, and we are the fellows who are really behind it," and they feel that that would tend to undercut them for future activities by way of control, so forth, and so on. That lies behind their position.

Now, I am not saying we agree with it, but we understand their position. That is why it is a tough one for negotiation.

Senator PASTORE. Were you impressed with that argument?

Mr. METZGER. Somewhat.

Senator ANDERSON. Would you not recognize they were talking about dignity in order to get away from being a signer of a note? That is all that was involved in it.

Representative HOLIFIELD. They were substituting dignity for collateral. Now, I would like to ask you a question: We had a similar case like this, where the United States Government loaned to the European Coal and Steel Community a substantial sum.

Mr. METZGER. That is right.

Representative HOLIFIELD. And did not the subscribing nations or participating nations perform an act of pledge which went behind the Community?

Mr. METZGER. No.

Representative HOLIFIELD. Let us read something on page 48:

There was also discussion whether or not an act of pledge similiar to that entered into by the European Coal and Steel Community was necessary or appropriate in the light of the conditions mentioned in the two preceding paragraphs.

And their convenience was discussed, but what happened in the European Coal and Steel Community?

Mr. METZGER. I can answer that this way: In the Euratom Coal and Steel Community, the individual member countries did not pledge their full faith and credit directly to the United States to repay the loan, which is the issue here. The act of pledge was another instrument.

Representative HOLIFIELD. It was an act of pledge to the Community.

Mr. METZGER. It had nothing to do with the member states. The act of pledge that was referred to here, and which is described in great detail in the Coal and Steel Community instruments, was as follows: We loaned $100 million to the Coal and Steel Community. The Coal and Steel Community promised, as a Community, to pay it back. The member states did not promise to pay it back. We buttressed the credit of the Community, which had insufficient resources at the time to pay it back, by providing that, when they reloaned the money, the $100 million that they borrowed from us, to the individual coal enterprises in the various countries, private enterprise, public enterprise, however they were organized, and got paper, when the Community got paper, mortgage liens, second mortgages, debentures, whatever they got, they would put that in a pledge, and whatever money they reloaned from borrowings that the Community made, say, from the Swiss, which they later did, and whatever paper they got from the underlying enterprises as a result of relending that money would go into this common pledge, so that, if there was a default by the Community on its $100 million obligation, principal or interest, and there was a question of enforcement of the underlying paper, we would not be in a position of having, perhaps, poor paper to enforce, whereas the Swiss would stand with good paper to enforce.

We were making sure that all the paper would be in a common pot, so that the Swiss could not insist on better paper as a result of their later deal than Euratom had secured as a result of relending our money. That was what the act of pledge was.

Representative HOLIFIELD. The result was, just the same, that it resulted in the depositing of collateral in a pool, which placed the United States on the basis of being able to reach for that collateral in case of default.

Mr. METZGER. Quite. But not against the member states; only against the enterprises.

Representative HOLIFIELD. Certainly, they would not go down to the member states, but they would go to this pool of collateral. Now, I ask, why can't such an arrangement be worked out on this particular problem?

Mr. METZGER. No reason at all, Congressman. In fact, what we were doing here, we were identifying various types of collateral which would have to be negotiated out. One thing you can insist on in negotiations is the full-faith-and-credit pledge such as Senator An-

derson is talking about. Maybe that will meet resistance; I suspect it will, for the reasons I have indicated. It may be, on the other hand, you can create, if you cannot get that, an act of pledge similar to what we worked out with the Coal and Steel Community. These are subjects for negotiation, and they are unresolved at present, but they are surely identified. They have not only been identified by this committee, quite properly, but they are identified by us, too.

Senator PASTORE. That is fine. I think we do not want to become too intricate about this. Some kind of collateral should be put by the Community. The only trouble is this: Unless we resolve these things now, Congress will not have a second bite at this cherry. Later on, once we have passed this law under section 123, then the whole thing becomes an executive function. While you have identified these matters, I think we ought to make it abundantly clear in our report that we would expect something at least as good as this pledge arrangement that you have been talking about. Do you agree or do you not agree with that idea?

You cannot leave this up in the air as an unidentified controversy and dispute and leave it entirely to the negotiators who are of the executive to commit the people of the United States.

Mr. METZGER. The only thing I can say is that the Export-Import Bank, and their representatives are here, set the terms and conditions for hundreds and hundreds of millions, if not billions of dollars worth of loans under their charter, and confidence is reposed in them to make loans on sound conditions.

If that confidence is justified, as I assume the record demonstrates it to be, there it is. On the other hand, if the Committee in effect wants to give directives as to the type of security, that is another matter.

Senator PASTORE. Let me ask the representative of the Export-Import Bank, has your procedure thus far been to loan money to governments or do you do it to private enterprise?

Mr. STAMBAUGH. Both. We prefer to foster private enterprise wherever we can.

Senator PASTORE. When you loan money to private enterprise, is it a requirement that you get an endorsement of the government? Do you get any collateral?

Mr. STAMBAUGH. We have required the guaranty in some cases of the central bank of the country where we could not find reasonable assurance of repayment without such a guaranty.

Senator BRICKER. It is not always a condition of your loan. You can loan to private industry under adequate security?

Mr. STAMBAUGH. If we can make a good loan without a guaranty we are happy to make it.

Senator PASTORE. Therefore, you could be prevailed upon to loan this $135 million without any pledge or any collateral at all. Am I correct?

Mr. STAMBAUGH. I do not think so. I think that it is implicit in what is before the Committee that an Export-Import Bank loan will have to be made within the provisions of the Export-Import Bank Act which was passed by this Congress and it provides that we must find reasonable assurance of repayment.

Senator PASTORE. Without any pledge whatsoever on the part of the individual government you could very well make the loan judiciously so——

Mr. STAMBAUGH. If we could find reasonable assurance of repayment. You mean without the guaranty of the six governments?

Senator PASTORE. Therefore, the terms and conditions we are talking about as spelled out on page 23 of this report does not necessarily mean that you will have to have collateral if you did not think it was required.

Mr. STAMBAUGH. That is right.

Senator ANDERSON. You see the position in which you are going to be put if this legislation goes through. I think Mr. Floberg's feeling is that we have to authorize the extension of a line of credit of $135 million. Not at all. All you would have to do is to be called into the office of the Chief Executive and the Chief Executive say "On June 23 I made this commitment, you lend them $135 million."

Since it would involve delicate relationships with a number of other countries you just have to go ahead and lend it to them, collateral or not. The Government pledges itself to provide $135 million if they don't do it.

Mr. FLOBERG. Under terms and conditions to be agreed.

Senator ANDERSON. I want to say, Mr. Metzger, that I certainly appreciate, and I hope the others do, the very frank and fine way in which you have tried to help us this morning. It has been very good, and your previous testimony has been. We appreciate the vast store of knowledge you have.

Mr. Stambaugh, I do not exclude you from this. We have had these things a number of times. This matter is a little different from the Iron and Steel Community in that they have properties that could be pledged. The Euratom will not have a nickel's worth of anything than can be pledged. It is a paper organization. The countries we are dealing with have evidenced their interest in this when they declined to pledge their full faith and security behind this. You have a paper organization that relieves them of any financial support. I had understood that was the only way they would agree to it.

If they are not economically all right, they want to be in a position to walk out and say "They belong to you, come and get them." This is the way it stands under this thing. That is why I say if these matters are to be corrected they have to be corrected in advance because once the act is passed the Export-Import Bank is in no position to resist the Executive authority. This would be a matter of high national policy.

Mr. STAMBAUGH. That is where we part company, Senator.

Senator BRICKER. What is the obligation of your country if the Export-Import Bank finds that they cannot lend the money under the terms and agreements proposed?

Senator ANDERSON. You are going to answer that at some later time?

Mr. FLOBERG. I will try to answer it this afternoon. I would like to give it a little more thought. (See letter, p. 247.)

Senator ANDERSON. You did say you thought Congress had authorized the extension of the line of credit of $135 million. Where did Congress authorize that? I believe you will find in your testimony that Congress authorized the extension of a line of credit for $135 million. It does not have to offer that?

Mr. FLOBERG. What I meant to say, and I will correct my testimony if I did not say this before was this; when these agreements were

drafted it was understood that the Congress had to authorize the actions to make them effective. Now we have no authority just by going over there and negotiating with these governments to bind the Congress. Everybody understands congressional action is necessary to make the international arrangement and agreement for cooperation to have any significance.

Senator ANDERSON. How long would it take to find out if these member countries are willing to pledge their full faith and credit to the payment of $135 million?

Mr. FLOBERG. I have not the slightest idea, but I suspect it will take quite a bit of time. That will be a matter of high national policy for them, too.

Senator ANDERSON. Senator Pastore asked that question a while back.

Mr. FLOBERG. Yes, sir; he did. I said we would undertake to explore that point. I would like to comment further on what either you or Senator Pastore said, that is, that I interpret this phrase, "Terms and conditions to be agreed," to include any directives that the Congress gives us in the report on this legislation and these agreements.

Senator PASTORE. I do not think we ought to be hasty about that, either. We have been thinking out loud. We may be going too far. Who knows? The fact of the matter is that we ought to have some kind of understanding. I think ultimately you ought to tell us what your recommendation should be and I think the Export-Import Bank ought to tell us how far they possibly might have to go.

I know they have a lot of latitude and I know they are going to protect the interest of the taxpayers of this country. There is no question about it.

I think we ought to know where we are going. It is fine to identify the controversy and the issue. Then somewhere along the line we have to resolve it. This is one way the people of the country will know from reading these hearings. I think at some point we ought to resolve it within reasonable limits.

Senator ANDERSON. As Mr. Metzger pointed out, this question of whether they were going to sign the note or not as an endorser came up and they could not resolve it. It is still open to negotiation. I think they have to settle it.

For example, in your testimony on page 22, about the second paragraph, it says:

> It is expected that the money spent for United States equipment and service will at least be equal to the United States line of credit of $135 million.

The agreement contains no requirement for the purchase of such items from the United States and since manufacturing costs tend to be lower in Europe, what assurance have we that any significant equipment purchases will be made from United States industry?

Mr. FLOBERG. I do not intend this to be a guaranty that will be true.

Senator BRICKER. It is not a condition of the Export-Import loan that any equipment purchased will be purchased from the United States?

Mr. STAMBAUGH. You ask me that question?

Senator BRICKER. Yes.

Mr. STAMBAUGH. It has been the interpretation of our act that we are to finance the foreign trade of the United States and not the foreign

trade of any other country. There have been instances in which, particularly a project that involved the purpose of rounding out a complete project, it has been necessary to permit the use of some part of our fund.

Senator BRICKER. Your bank has to officially approve that?

Mr. STAMBAUGH. That is right.

Senator ANDERSON. But this $135 million need not be spent in the United States, need it?

Mr. STAMBAUGH. Yes; if we make the loan.

Senator BRICKER. If the Government should make the loan, if you should turn it down under credit conditions, then there is no such requirement?

Mr. STAMBAUGH. What agency are you talking about?

Senator BRICKER. The Treasury.

Mr. STAMBAUGH. I think the answer to that is that the Export-Import Bank is the only agency of the Government charged with responsibility for financing the foreign trade of the United States. So any other agency might be free to finance all sorts of purchases.

Senator BRICKER. A direct Treasury loan which we are authorizing if you do not make the loan yourself.

Mr. STAMBAUGH. That is right.

Senator PASTORE. Now I think you ought to clear the record. Therefore, when you said in the beginning that you would expect the full faith and credit of the Nation to be pledged before you make this loan, you went a little further than you thought you should. I think in the opening statement under examination by Mr. Anderson, you took the position that the Export-Import Bank would never make this loan unless you got the full faith and credit of the individual governments. I think you ought to correct the record on that.

Mr. STAMBAUGH. I don't recall that I said that. I am quite certain, Mr. Pastore, what I said was that it had been represented to us that the full faith and credit of the six countries would be behind this line of credit.

Senator PASTORE. Of course, the gentleman has already explained that was identified as an issue and it could not be resolved. I think the way he has explained it is this way, that there is a binding agreement between the individual government and Euratom because of the treaty. Now that is maybe what they are talking about.

Senator ANDERSON. Before the afternoon session opens, can you show us where in the treaty that binding obligation is by a memorandum, or otherwise?

Mr. METZGER. We can prepare a memorandum for you, Senator. I prefer to do that.

Senator ANDERSON. Prepare a memorandum which says on page so and so it says so and so.

Mr. METZGER. I think you have to read several sections together.

Senator ANDERSON. I think you have to read it over and over again and patch it together.

Mr. METZGER. Not only that, but you have to read several sections.

Senator ANDERSON. Do furnish us with a memorandum. If you are not able to do it by the opening of the afternoon session, fine. We will take it up sometime later.

Are we through with the representative of the Export-Import Bank?

Thank you, Mr. Stambaugh, for coming. It is courteous of you to come on short notice. We appreciate you being here.

Mr. STAMBAUGH. It is a pleasure.

Senator ANDERSON. Now after that very brief interruption, Mr. Floberg——

Representative HOLIFIELD. Mr. Floberg, I started to question you in regard to section 3.

Mr. FLOBERG. Yes; you did. I was going to suggest that that should be delayed until I get to the bottom of page 14 where we have the question of the availability of information, if that is all right with you.

Representative HOLIFIELD. Go ahead.

Mr. FLOBERG. I am now reading from the top of page 13.

PROVISION OF NECESSARY SERVICES

The Community also requires long-term assurances for reprocessing the spent fuel elements from the program. Accordingly, pending the coming into being of suitable processing facilities in the Community or commercial facilities in the United States the Atomic Energy Commission also would be prepared to perform, on terms and conditions to be agreed, chemical-processing services with respect to any source or special nuclear material received by Euratom from the United States under this program. Section 6 of the proposed legislation would perimt the Atomic Energy Commission to enter into long-term contracts with the Community to provide such services at United States domestic prices. The contracts would be executed in accordance with the terms of the agreement for cooperation and accordingly, would not extend for a period longer than 25 years and probably would be for a shorter time.

Representative HOLIFIELD. I have looked over these two pages. I do not see that they have anything to do with my question. I think my question would be in order right now.

Mr. FLOBERG. If you prefer it that way, Mr. Holifield, it is all right with me.

Representative HOLIFIELD. I have waited 2 hours now to ask the question. I would like to ask it. I am afraid my lunch will not agree with me if I don't ask it.

Section 3 of the bill H. R. 1311 provides for some $50 million for use in a program of research and development in connection with the types of reactors selected by the Commission and the Community under the joint program. In section 4 there is a $90 million authorization for the purpose of fabricating, processing, transporting fuel, guaranteeing the life of the fuel.

Now for the $50 million which we put up, and I understand that Euratom will also put up $50 million—they are obligated at least in their research and development—I wanted to ask you if there will be a mutual sharing of the results of that combined research and development between the United States and Euratom.

Mr. FLOBERG. The answer to your question is in the affirmative.

Representative HOLIFIELD. Will the participating United States business firms and the European business firms share in that research and development?

Mr. FLOBERG. The answer to that is "Yes, sir."

Representative HOLIFIELD. And they will receive the benefits of that research and development?

Mr. FLOBERG. Yes, sir.

Representative HOLIFIELD. Now we have confined it so far in my question to the business firms participating. Will the research-and-development results be available to all American industry?

Mr. FLOBERG. Yes, sir.

Representative HOLIFIELD. Will the use of patent rights which might accrue to the participating industries beyond that of nonparticipating industries be available on a free basis to American industries?

Mr. FLOBERG. Yes, sir.

Representative HOLIFIELD. These are the answers I hoped you would make.

Senator PASTORE. Under what rule of law? Under the terms of the agreement?

Representative HOLIFIELD. In question 18 we asked:

> What will the United States patent policy be with respect to American fuel element fabricators through whom the AEC extends fuel element guaranties?

The answer of the Commission was:

> The Commission has not determined what patent rights, if any, it believes it should obtain with respect to patents developed by manufacturers covered by fuel element guaranties. If the Commission decides to obtain any patent rights, such rights will be limited to use of such inventions and discoveries by the United States Government with respect to construction and operation of Government-owned reactors. We believe this approach will assure that the Government obtains such rights as are necessary for its own needs and at the same time permit manufacturers to be in a position to license others to use such patents.

I submit that part of your answer is in direct opposition to your previous answer.

Mr. FLOBERG. No, sir. Let me explain the distinction between the two.

Representative HOLIFIELD. All right.

Mr. FLOBERG. The line of questions that you asked me referred to the research and development program which will be undertaken in accordance with the agreement.

Representative HOLIFIELD. That will include all types of fuel processing and fabricating?

Mr. FLOBERG. To whatever it includes my answers apply, the fuel elements will be included in that.

Representative HOLIFIELD. I am interested in obtaining better fuel elements, better elements of processing, and so forth, because $90 million of the taxpayers' money stands as a guaranty to the life of these fuel elements.

Mr. FLOBERG. That is correct.

Representative HOLIFIELD. Now unless the research and development that is done is available to the United States Government for use in its own reactors, and is available not only to the participating industry but is available to all other industries in the United States, then we are in an unfair position in using public money.

Mr. FLOBERG. I agree with you. Question 18 does not refer to the research and development program to which your previous line of

questions referred. This refers only to privately developed fuel or fuel elements on which the Commission's only obligation is the guaranty obligation. That is the distinction between the two.

Senator PASTORE. Why do you make the distinction? It is still the taxpayers' money.

Mr. FLOBERG. The distinction is not in the taxpayers' money. The distinction is in the rights of all industry to participate in the utilization of the knowledge and the techniques of manufacture and so forth, of these fuel elements. The question is whether the fuel element or anything else has been developed under the joint research and development program of whether it has otherwise been developed and its performance is guaranteed in accordance with the terms contemplated by question 18.

Senator PASTORE. I understand what you are saying but I cannot understand the reason for the distinction you are making. In other words, if GE is developing a fuel element upon which it could only make a limited guaranty because the results would be unknown, and for that reason you would have to invoke the provisions under this $90 million that we are talking about in order to give the warranty for the life of the fuel element. Now in that particular case you are saying that because this is between GE and Euratom and we are a third party really agreeing to guarantee to a certain extent, that in that case it is a private transaction and for that reason all industry in America would not be entitled to whatever research and development accrues out of that transaction. Isn't that what you are saying?

Mr. FLOBERG. That is a correct statement of my position.

Senator PASTORE. Why are you making that distinction? That guaranty you put up is being put up with taxpayers' money. It is not completely a private transaction.

Mr. FLOBERG. I do think there is a difference. The difference is that this is a contingent liability. The actual development of the item in question has been done with the organization's own funds. I think there is a distinction.

Senator PASTORE. I do not think so. I say this, that where the private concern is willing to make a guaranty that does not require supplementation by the United States in any form, you have a private transaction to which an outsider would not be entitled to any benefits. But where the United States has to pledge itself to write off an inadequacy in the fuel element and for that reason it has to make the supplemental guaranty, then I think you have a public interest involved and I think it ought to belong to everyone. I mean there is a distinction there. Once you have pledged taxpayers' money, I think it is in the public domain.

Mr. FLOBERG. That is the issue. That is exactly the isolation of the point. The question is, When the only relationship of the taxpayers' money to the item in question is the contingent liability contemplated by this guaranty, does that put it in the public domain? The answer to that is a matter of policy determination, and I expressed my opinion that it should not and if the Congress thinks it should then we differ.

Senator PASTORE. While it is true that the liability may be contingent the fact of the matter is that the relationship would never have come about only because we were willing to assume that. There is your public domain.

Mr. FLOBERG. That is correct.

Senator PASTORE. If the United States Government were not willing to pledge itself, then the private concern would not be able to do business with Euratom. It only comes about because the people of the country are willing to take a risk. The minute you have people of this country taking a risk, then I say you have a public domain and it belongs to everyone.

Representative HOLIFIELD. Were you going to respond to that?

Mr. FLOBERG. No; I think the positions are perfectly clear, Mr. Holifield.

Representative HOLIFIELD. I am going to see if it is clear. I want to bring up an illustration. Let us assume, and I will take this company without any particular regard, let us say, that Westinghouse under this setup reaches an agreement with X company in Italy to build a reactor. We have to finance that through the $135 million loan and other assistance which we have given and they have a fuel rod which will only last 7 years, and it is a patented fuel rod, let us say. Then the $90 million contingency comes into play. The Government steps in and it makes up the additional 3 years in one way or another but there is also a factor involved under section 3. The Government is carrying on with Euratom a program of research and development which will make this rod last for 15 years or 12 years.

Now the question occurs, Is it in the Government's interest to immediately give this research and development to Westinghouse to relieve itself of the $90 million liability section? Now whose information is that? When they give this information to Westinghouse, Westinghouse immediately perfects its fuel rod which is already patented. Is it entitled to improve on its patent with Government research and development money?

Mr. FLOBERG. No, sir; that is the point. If this is an improvement which springs from the research and development program contemplated by the agreement, then then is no question that that improvement is in the public domain.

Representative HOLIFIELD. Then such knowledge would be in the public domain.

Mr. FLOBERG. Yes; that is correct.

Representative HOLIFIELD. If Westinghouse used it, it might be in the interest of the Government to use it on its contract but it would not necessarily mean that Westinghouse could prevent the use of that improvement by others, or could they, because of their basic patent, prevent the use of it?

Mr. FLOBERG. We are trying to argue the legal question without knowing what all the facts are. But my general statement is that if the development is the product of the research and development program, then the information belongs to everybody. On the other hand, if the development is the product of the manufacturer, financed by himself, and the fruit of his own fertile brain, the opposite would be true. That is the general statement.

Representative HOLIFIELD. If they improve their own rod with their own money and it involves patent rights and improvement on their original patent, I agree with you that it would be possibly their property and the contingency would be a thing that would be separate and apart.

Mr. FLOBERG. My intention in stating my position to Senator Pastore was that the entrance of the guaranty should not affect that principle.

Representative HOLIFIELD. No. I think the entrance of research and development should affect it but not the contingency because that is for another purpose. You go ahead in this answer:

Section 152 of the Atomic Energy Act provides that any invention or discovery useful in the production or utilization of special nuclear material or atomic energy made or conceived under any contract, or subcontract, arrangement or other relationship with the Commission shall be deemed to have been made by the Commission.

Except that the Commission may waive its claim to any such invention or discovery if made or conceived by any person at or in connection with any laboratory under the jurisdiction of the Commission as provided in section 33 or under such other circumstances as the Commission may deem appropriate.

You have a loophole there as wide as a barn door.

Then you introduce a note of doubt. You say:

Whether or not this section would be applicable to fuel guaranty contracts has not been determined. However, even if it were so determined the Commission would take such action under the waiver authority set forth in this section as would be consistent with the approach outlined above.

So even though the Government contributes to the work of a privately owned patented fuel rod, you still have the opportunity to waive the Government's interest.

Mr. FLOBERG. What that sentence says, Senator, is that we lawyers can have a good wrestling match as to whether section 152 does or does not include just this guaranty contract within its terms. In other words, we can sit down and have a good legal argument as to whether the guaranty and nothing else draws the improvement within the framework of section 152. What we are saying is that even if it does, no matter who wins the legal argument, that as a matter of policy we feel what I previously stated, that when the only contribution of the Government to the improvement is the contingent liability of the guaranty, then that means we should waive our right under section 152. That does not mean we waive any rights under the things developed with the implementation of the research and development program.

Representative HOLIFIELD. I understand your statement.

Mr. RAMEY. You say you have not yet decided whether or not you would take a license for Government-owned reactors? You might do that or you might not.

Mr. FLOBERG. I think the minimum we would do would be that, that we had decided so to do.

Representative HOLIFIELD. I was hoping that the policy had been determined, that if there is any research and development under this $50 million, that the Commission will claim that right for the public domain.

Mr. FLOBERG. No question about that. I believe Mr. Ramey was referring to an improvement that was made only under the guaranty.

My answer to you, Mr. Ramey, is that we feel that we should have at least the Government employment rights that are described here, even in that limited case.

Representative HOLIFIELD. For its own reactors?

Mr. FLOBERG. That is correct.

Senator PASTORE. In other words, compensation would depend on the contribution or the risk assumed.

Mr. FLOBERG. The contribution of the Government, at least.

Senator PASTORE. I think you ought to have some latitude but I do say you ought to have something there. I think the discussion ought to be within the Commission to decide it and I think it ought to be written in the agreement itself. In one case the risk that we assume might not be very negligible. In that case it might be if we had not assumed that risk we might never have a contract to begin with. You might decide there ought to be compensation made to the manufacturer. I think we ought to have something there, you ought to have some latitude there. After all, why are we doing this? We are doing this to promote this whole industry.

Mr. FLOBERG. That is certainly true.

Senator ANDERSON. Is Mr. Anderson's understanding the same? Will you answer that?

STATEMENT OF ROLAND ANDERSON, CHIEF, PATENT BRANCH, ATOMIC ENERGY COMMISSION

Mr. ANDERSON. On research and development I agree with Mr. Floberg's answer. As regards the guaranties, I think the statement was that the Commission was not committed itself in the Euratom treaty at all.

Senator ANDERSON. The committee will recess until 3 o'clock this afternoon in this room.

Whereupon, at 12:25 p. m. the committee was recessed, to reconvene at 3 p. m. the same day.)

AFTERNOON SESSION

Present: Chairman Durham (presiding); Senators Anderson, Bricker, Pastore, and Dworshak; Representatives Holifield and Price.

Also present: James T. Ramey, executive director.

Chairman DURHAM. The committee will come to order. This is a continuation of the hearings on Euratom.

Mr. Floberg, you are on page what?

Mr. FLOBERG. Page 13, point 5.

STATEMENT OF HON. JOHN S. FLOBERG, COMMISSIONER, ATOMIC ENERGY COMMISSION—Resumed

This point is the purchase and disposition of plutonium. The reactor operator requires assurance that there will be a market for the plutonium he produces. It was concluded, accordingly, that it would be necessary to provide the Commission with authority to enter into contracts with Euratom which would provide the utilities participating in the program with a long-term assurance regarding the acquisition by the United States of the plutonium they produced.

Section 7 (b) of the proposed Euratom Cooperation Act, accordingly, provides that the Commission may enter into contracts for the acquisition of such material for the first 10 years of operation or until December 31, 1973, whichever is earlier. The plutonium would be purchased at the Commission's established fuel value price at the time of delivery for such material. Section 7 (c) of

the draft bill further provides that the Commission may enter into contracts to purchase enriched uranium from the Community provided that any such contract does not extend beyond the terminal date of the agreement for cooperation.

The quantities so acquired would not exceed those distributed to the Community by the Commission, less burn-up, and would be purchased at a price that did not exceed the Commission's established charges in effect at the time of delivery.

Ample arrangements have been made to assure that the plutonium produced in the program will be used only for peaceful purposes under continuing safeguards. Under the terms of the agreement for cooperation the Community will be able to use as much of this plutonium as it requires for the peaceful uses of atomic energy. This material will be subject to the safeguard arrangements that have been agreed to with Euratom. In addition, in special recognition of the International Atomic Energy Agency, the Agency will have the first option to purchase any special nuclear materials produced in reactors fueled by the United States, under the joint program, which are in excess of the Community's need for such material for peaceful uses.

In the event the Agency's option is not exercised, the United States, subject to the provisions of the proposed Cooperation Act, would be prepared to purchase the material. Such purchases by the Agency or the United States would be at the established fuel value price in effect in the United States at the time of purchase. Section 7 (a) of the proposed bill authorizes the Atomic Energy Commission to acquire from the Community up to 4,100 kilograms of plutonium for peaceful purposes.

I will pause for questions on that section.

Chairman DURHAM. Why the limitation of 4,100 kilograms?

Mr. FLOBERG. To put a ceiling on our potential obligation.

Chairman DURHAM. I think that is a sound idea.

Mr. FLOBERG. Thank you, sir.

Representative HOLIFIELD. On the option of the IAEA to buy special nuclear material, does that include plutonium?

Mr. FLOBERG. That does specifically include plutonium.

Representative HOLIFIELD. Provided it is for peaceful uses?

Mr. FLOBERG. That is correct.

Representative HOLIFIELD. In other words, they could not buy for war purposes, for military purposes?

Mr. FLOBERG. No, sir.

Chairman DURHAM. All right, we will go to D, if there are no further questions.

Mr. FLOBERG. Availability of information derived.

Inasmuch as one of the major purposes of the proposed program would be to provide industry in the United States and Europe with important experience and data on capital and operating costs, it has been agreed that certain information developed in the course of the program should be disseminated promptly without discrimination.

Under the mutually agreed arrangements, technological, and economic data developed under the joint program will be made available to the industries within the Community and the United States under provisions designed to assure widespread dissemination.

Manufacturing know-how or techniques financed by private funds would be made available only under normal commercial arrangements to the extent desired by private industry. The patent arrangements also are designed to facilitate this purpose in that they afford rights to the industries within the United States and the Community to utilize the inventions developed in the research and development program.

Chairman DURHAM. Are there any questions on this section? If not, we will go to E.

Mr. RAMEY. The language of the agreement is not entirely clear on the question of know-how developed by a manufacturing company, as to whether or not that is not required to be made available without discrimination to all industries in the Euratom countries.

Mr. FLOBERG. Mr. Ramey, the point of my testimony was specifically to clarify that point.

Mr. RAMEY. Yes. I gather it is your intent that the manufacturer does retain his know-how.

Mr. FLOBERG. That is correct.

Mr. RAMEY. As I say, the language, however, which would be the controlling thing, I believe, does not necessarily give that.

Mr. FLOBERG. Well, the language does not provide for the exchange of these manufacturing techniques or know-how.

Mr. RAMEY. It talks about detailed design information, as I recall it.

Chairman DURHAM. In the language here you say under the mutually agreed arrangements, technological and economic data developed under the joint program would be made available to the interested within the Community. Isn't that correct? Isn't that plain enough language?

Mr. RAMEY. I think what that means, as I understand, Mr. Durham, in the joint research and development program, the information developed will be made available to everybody.

Mr. FLOBERG. That is correct.

Mr. RAMEY. Where a manufacturer develops the detailed proprietary information on a particular project, apart from the research and development program, he can retain that information and sell it to anybody, but he has the control over it. He is not required, and the Commission is not required, to make that information generally available. As I say, I am not sure the language of the information provisions necessarily restricts that. I was trying to find it. That is in the agreement for cooperation, I believe.

Chairman DURHAM. What did you say? In the particular country, the manufacturer doing the design work or whatever it happened to be, would be in a position, even though he was using funds through this Euratom agreement, where he would be able to secure patents and use them for his own private good?

Mr. RAMEY. He could not secure patents, but, as I understand it, Mr. Durham, it would be nonpatentable information which they generally speak of as proprietary information and know-how, that he could hang onto that. I believe the language in question is in article VI–A. 1 on page 24 of the committee print. It says:

> Under mutually agreed arrangements, all nonpatentable information developed in connection with the joint program of research and development—

there is no question there—

and all nonpatentable information developed in connection with selected projects concerning designs, plans, and specifications, construction costs, operations, and economics—

that would mean with respect to the selected projects—

will be delivered currently to the parties as developed and may be used, disseminated, or published by each party for any and all purposes as it sees fit without further obligation or payment.

The question is whether this language with respect to selected projects concerning design, plans, and specifications, construction costs, operations, and economics——

Mr. FLOBERG. You are stating there is an ambiguity in that language and that you are disturbed by it.

Mr. RAMEY. Yes. And we have had several American industrial organizations who have expressed concern about it also.

Mr. FLOBERG. Well, it is my intention to attempt to clear up that ambiguity by testifying the way I did, Mr. Ramey. I agree with you that the agreement is more important than my testimony. But in the case of the ambiguity, I am stating what our interpretation of it is, and I believe that this statement on the record of our interpretation of that ambiguity should be at least helpful if not controlling. We will certainly call it to the specific attention of the Euratom people.

Chairman DURHAM. All right. If there are no further questions, we will go to E.

THIRD PARTY LIABILITY

Mr. FLOBERG. As the Joint Committee is aware, the liability position of American equipment manufacturers participating in the foreign market has received intensive study by the Commission and the Department of State. In the course of our negotiations with Euratom there was complete agreement that the implementation of the proposed program would be dependent upon the realization of adequate measures to protect equipment manufacturers and other suppliers against uninsurable risks.

Under the terms of the memorandum of understanding and the agreement for cooperation, the Euratom Commission will seek to develop and to secure the adoption, by the earliest practicable date, of suitable measures which will provide adequate financial protection against third party liability.

This could involve suitable indemnification guarantees, national legislation, international convention, or a combination of such measures.

We believe that the pressure of the joint program will necessarily result in early action to solve the third party liability problem.

Further, it is expected that the progress made will not only accommodate the immediate needs of the proposed program and other nuclear projects within the Community, but also might provide the basis for a general solution which will be applicable to other areas.

Chairman DURHAM. Are there any questions?

Senator ANDERSON. Can we ask there this question? This was originally discussed a good many months ago. Has any bill been introduced into the parliament or legislative body of any country that would have anything to do with third party liability?

Mr. FLOBERG. Let me ask Mr. Ferguson to respond specifically to that question.

Mr. FERGUSON. I do not know that any bills have been introduced in any parliaments of the countries involved. There have been bills drafted, draft bills, in Germany, I think in England, and one other country, that have been referred to the governmental authorities for consideration.

The major effort, however, is in the drafting of a convention, a proposed international convention, by a so-called committee of legal experts in the OEEC. That is the Organization for European Economic Cooperation, the 17-nation group.

A draft of that convention was circulated last month. There was a meeting earlier this month in Paris on that convention. I understand that, as a result of the discussions there, there is to be a substantial rewrite job. The hope is that a draft convention can still be circulated to the governments yet, this calendar year, for consideration and action.

Senator ANDERSON. We heard a great deal about the importance of Russia in this alone. If you are going to contract for the American manufacturer to supply them materials, he is going to want to know what the insurance situation is, the manufactured products liability, or whatever you may term it, and if you can tell him only that nothing has yet been done, then that presents some urgency, doesn't it? They will not be able to contract for the American contractor of suppliers.

Mr. FERGUSON. They are working actively and seriously on it.

Senator ANDERSON. But the full OEEC is a long way different from the Euratom Community.

Mr. FERGUSON. It includes some members, but it is different; yes.

Senator ANDERSON. NATO includes Euratom, but we don't deal with NATO on this; do we?

Mr. FERGUSON. No.

Senator ANDERSON. Then why should we with OEEC? Why don't they do it in the Euratom Community if it is so urgent?

Mr. FLOBERG. I think they will. That is what I tried to testify. They know as well as we do that nothing can get off the dime until this problem is solved. This is a substantial problem.

Senator ANDERSON. What is the use of trying to shove us off the dime until it is solved?

Mr. FLOBERG. I think that is what will get them off the dime, the pressure of the impending program.

Senator ANDERSON. Each time we have to move first. We have to decide whether they are going to get a loan before they decide whether they want to endorse the paper.

Why can't they move a little bit? After all, we are supplying $400 million worth of uranium, we are supplying $50 million in research and probably another $50 million in research. We are supplying a $150 million loan.

Mr. FLOBERG. They have agreed in the agreement of cooperation, as referred to on page 25, to seek to develop and secure adoption by the earliest practical date of suitable measures which will provide adequate financial protection against third-party liability.

That is article IX on page 25, Senator.

Representative HOLIFIELD. What I want, and I think what this committee wants, is assurance that there will be no liability accrue

to the United States as a result of any program. In other words, if these people be not willing to accept their indemnification liability and guaranties and so forth, we don't want to have it backfire on us.

Mr. FLOBERG. I agree completely.

Representative HOLIFIELD. And there will be no agreement unless that is taken care of.

Mr. FLOBERG. I agree completely.

Mr. RAMEY. Is there a nonindemnity provision in favor of the United States?

Mr. FLOBERG. In the agreements themselves?

Mr. RAMEY. In the agreement for cooperation. They are normally in the other agreements for cooperation, and I believe there was in bilaterals.

Mr. FLOBERG. I believe it is covered in the agreement for cooperation at article VI D on page 24.

Representative HOLIFIELD. That does not cover it.

Mr. FLOBERG. Well, it does not cover it very well. I will agree with that.

Representative HOLIFIELD. How about article IX?

Senator ANDERSON. There ought to be some sort of a hold harmless agreement in this. Don't we make that sort of agreement with the British, for example, and the Canadians? Why shouldn't we do it here? It ought to be written right into the bill; hadn't it?

Mr. FLOBERG. Well, it certainly all proceeded on the understanding that that is implicit in this, Senator. Article IX recognizes the implicitness of it. I can't point it out to you in words. I gree with that.

Representative HOLIFIELD. Well, in discharging our responsibility, the spending of Government funds, it appears to me that it might be good to have a section in this bill, Senator Anderson, which would protect us against that sort of risk.

Senator ANDERSON. I fully agree. Section IX may give it a chance to protect the American manufacturer, but this Government is going to help send reactors to that country, and there certainly ought not to be any liability against the United States just because it gave away some material and loaned a little money.

Mr. FLOBERG. Well, I certainly agree with that.

Senator ANDERSON. We ought to be able to get a hold-harmless agreement of some kind in here.

Chairman DURHAM. Are there any further questions? If not, we will proceed to tariffs.

Mr. FLOBERG. As these projects come up, I would certainly anticipate that they would have complete hold-harmless provisions in them, Senator.

Senator ANDERSON. And it would be your effort to write them in when they got to the Atomic Energy Commission?

Mr. FLOBERG. Certainly it would, Senator, and certainly as to any material we transferred, any fissionable material, there would be no question about that. As far as this Commissioner is concerned, there would be no doubt about it.

Senator ANDERSON. Commissioner Vance, you would agree with that, wouldn't you?

Mr. VANCE. Yes, sir.

Mr. RAMEY. As far as Euratom is concerned, it would almost have to be in the agreement for cooperation, wouldn't it? That is, as far as the liability of the United States Government to the Euratom as an entity?

Mr. FLOBERG. In the case of the sales of the material, that would be covered by agreement with Euratom.

Senator ANDERSON. Not by the present agreement.

Mr. FLOBERG. By the transaction of sales, Senator, as the material is transferred.

Mr. RAMEY. The agreement for cooperation itself provides for the transfer of the sale, doesn't it?

Mr. FLOBERG. That is true, but there will be a further implementing agreement in connection with that, Mr. Ramey. There will have to be subsidiary detailed implementation of that.

Senator ANDERSON. Why?

Mr. FLOBERG. Because this agreement is too general in its term, I would say, Senator.

As a matter of fact, article VI D does provide that in the case of the sale of any material, there is in effect, a hold harmless.

Senator ANDERSON. Does it? Read it out loud, where it says that.

Mr. FLOBERG. Pardon me?

Senator ANDERSON. You read out loud where it says that. You are talking about page 24?

Mr. FLOBERG. Page 24.

Senator ANDERSON. VI D? That says where the sale of material is made that we would have a hold-harmless agreement?

Mr. FLOBERG. Let me read the language that I think covers that point:

> The application or use of any information and any material, equipment, and devices exchanged or transferred between the parties under this agreement, shall be the responsibility of the party receiving it.

And "the other party does not warrant" and so forth.

Representative HOLIFIELD. Would you say that that wording would cover reactors?

Mr. FLOBERG. Yes, sir, I would think so.

Mr. RAMEY. On the other hand, you normally have the standard kind of indemnity language in your bilaterals that says that they indemnify and hold harmless the United States Government in connection with the transfer of the material, et cetera, et cetera.

Mr. FLOBERG. That language is used in connection with the lease of materials, Mr. Ramey. I agree with you, however, that this is not standard indemnification language. I do think, however, that it covers the point.

Chairman DURHAM. All right. We will go to F.

TARIFFS

Mr. FLOBERG. In keeping with the overall objective of keeping the costs to be borne by the utilities to a minimum and to facilitate the import of American equipment in support of the program the Euratom Commission, in paragraph 13 of the memorandum of understanding has agreed (and I quote) to—

> take all action open to it under the treaty (establishing the European Atomic Energy Community) to minimize the impact of customs duties on goods and products imported under this joint program.

Senator ANDERSON. Mr. Chairman, do you mind if I went back to the other question of a minute ago?

In all of the other agreements we have a hold-harmless provision, so that this could not possibly have been overlooked by the Atomic Energy Commission and others in the negotiation of this. Why was this left out? Was these objection to it on the part of the European communities, the Euratom communities?

Mr. FLOBERG. Senator, I believe that the specific hold-harmless language is included in all agreements where lease of the material is involved. I do not believe it is so included in all agreements where sale of material is involved. If that is wrong, I am prepared to be corrected.

Mr. RAMEY. I think the agreements provide the option for lease or sale, to my recollection. They say that the material may be transferred either way, as I recall.

Mr. FLOBERG. But the points of the language is that it is put in there to cover the option to lease.

Mr. RAMEY. I would think you would want your lawyers to look into that a little bit, but I don't think it is just a question of whether it is lease or sale. It would not necessarily make any difference as to liability.

Mr. FLOBERG. Mr. Vogel represents himself as being informed on this, Mr. Chairman. Could I ask him to comment on it?

Mr. VOGEL. In all of the power agreements prior to 1957, the provision for the transfer of U–235 was by way of sale only, and in those agreements, the only indemnity provision is a disclaimer similar to the one in article LX of the proposed agreements with Euratom.

Mr. RAMEY. And in the one since 1957?

Mr. VOGEL. It is provided that the material may be transferred by way of sale or lease, and in that case it is provided that where it is leased, the cooperating country will hold the United States Government harmless. But where it is sold, there is merely a disclaimer.

Representative HOLIFIELD. What position is the United States manufacturer in, in regard to exporting the parts of a reactor to a foreign country? Does he have to assume any third-party liability?

Mr. FLOBERG. That depends on the terms of his agreement with the customer. That is something that can be controlled by the contract of sale.

Representative HOLIFIELD. What happens in the case of the English? Does the English Government assume third-party liability in a foreign country?

Mr. FLOBERG. I am not informed on that. I will see if we have anybody here who is.

I don't find anybody confessing to the knowledge of the answer to that question, Mr. Holifield.

Chairman DURHAM. All right. F?

Senator ANDERSON. G.

Mr. FLOBERG. If there are no questions on F, I will go to G.

COMPARISON OF PROPOSED INCENTIVES TO BENEFITS BEING ACCORDED INDUSTRY IN THE UNITED STATES

I should like to compare the incentives I have outlined, with the benefits that are now being accorded by the Commission to industry in this country.

In comparing the type of assistance given domestic reactor operators under our power demonstration reactor program with that proposed for the joint United States-Euratom I believe one must take into consideration the differences in the basic objectives of these two programs.

As we stated in a recent hearing before the committee, the objective of the nuclear power development program in this country is to achieve competitive nuclear power in the United States within the next 10 years and in friendly foreign nations within the next 5 years.

This time differential arises from the fact that the cost of conventional power in foreign nations is generally much higher than in the United States and, therefore, nuclear power abroad is expected to be competitive at an earlier date than in the United States.

In our judgment the time differential in achieving these basic objectives at home and abroad calls for a different type of assistance program. The domestic objective requires a program to explore the technical and economic potential of various reactor concepts and sizes. It must involve a full scale, practical and industrial on-stream testing of the competitive advantages of several reactor types so that we may be in a position, over the next decade, to build the best unit or units for each job to be done.

On the other hand, the need in the European Atomic Energy Community, for example, for a sizable nuclear power capacity at an early date makes it undesirable to undertake a long-range program of balancing the pros and cons of the various reactor concepts before moving ahead on a large-scale basis. The importance of the time element dictates a program based on the rapid commercial exploitation of already proven reactor types.

Chairman DURHAM. That is just what we have been advocating for many years. We have to build a large-scale plant before we would be able to determine the results of producing power. That is what you are saying in effect here. The only plant that would give you the know-how would be large-scale plants.

Mr. FLOBERG. They give you know-how and experience; yes, sir.

The assistance program which is thought to be most useful in achieving the domestic objective consists of a fuel use charge waiver, which offers financial incentive, and flexible research and development assistance and which offers the greatest possible technical incentives by giving weight to the relative difficulties and complexities of different reactor systems.

The assistance program by which the foreign objective can best be achieved is one which, by offering financial incentives in the form of cost and life guaranties of fuel elements which are tied to specific reactor types, and technical incentives in the form of a research and development program aimed at improving the overall fuel cycle and the technical and economic efficiency of such reactors, encourages the early construction for commercial use of proven reactor types.

The basic differences in the requirements to meet our objectives in the domestic and foreign power reactor programs and the resulting differences in the type of assistance contemplated in the two cases, makes any quantitative comparison have little meaning.

However, a qualitative comparison of the two programs of assistance is attached to this statement as appendix B.

A facet of the Euratom program which does not lend itself even to qualitative evaluation, but which nevertheless is quite real in determining the relative value of AEC assistance to domestic and Euratom utilities, is the extent to which it will stimulate conditions under which nuclear power will be economic.

Under the proposed program important benefits will accrue to the United States as a result of the research and development program, from the know-how gained during construction of reactor components and fuel elements, from operation and maintenance of full-scale power production plants, and from industrial scale transportation, processing, and waste storage. The successful implementation of the Euratom program will be of great benefit to the domestic program.

Chairman DURHAM. Are there any questions?

If not, we will go to H.

SAFEGUARDS AND CONTROLS

Mr. FLOBERG. In its presentation the Department of State outlined for you the arrangements that have been agreed to with the Community to assure that the equipment and materials received from the United States as well as the special nuclear materials derived therefrom will be used only for peaceful purposes.

The Atomic Energy Commission and the Department of State reviewed extensively with Euratom this aspect of the proposed program. We are in agreement that the understandings that have been worked out recognize the Community's unique institutional characteristics and at the same time promise to provide the United States with adequate and continuing assurance that the materials involved are being used only for peaceful purposes.

The proposed safeguard arrangements with Euratom are unique and have been developed to recognize the Community's status as an international body with important powers as well as the spirit of close and joint cooperation which underlies this entire proposal.

In ratifying the treaty which established the Community the six nations gave up their individual rights to own special nuclear materials to the Community in order further to guarantee its control responsibilities.

Under the terms of the treaty the Community has been charged with establishing a comprehensive safeguard and control system over designated atomic materials within the territories of the member states.

This system will represent a distinctive and important step because it will be applied to materials in one of the most technologically advanced and strategic areas of the world.

The Community already had taken steps to establish this system. Its representatives and we believe it will represent a significant advance in multinational control of nuclear materials. It is likely to be the first international effort to control a major nuclear power complex.

Under the proposed joint program, the Community will have the

responsibility for establishing and implementing a mutually satisfactory safeguards system according to agreed-upon principles.

The Community has requested, and we have agreed, to provide assistance in meeting this responsibility. Our initial participation in the establishment of the system should provide us with invaluable experience on matters relating to inspection and accountability and should result in the development of ideas which will benefit the rest of the world including the International Atomic Energy Agency.

The principles to be followed in establishing this system have been patterned after, and are compatible with, the safeguards principles contained in the statute of the International Atomic Energy Agency, and in relevant articles of the United States power bilateral agreements for cooperation.

No special nuclear material will be shipped from the United States until the system is established in accordance with these agreed-upon standards.

The safeguards arrangements as expressed in the agreement for cooperation contain guaranties by Euratom that no source or special nuclear materials utilized in, recovered from or produced as a result of the use of materials, equipment, or devices transferred pursuant to the agreement for cooperation will be used for atomic weapons, or for research on or development of atomic weapons, or for any other military purpose.

Provision is made for frequent visits and consultations to assure that the agreed-upon system is operating effectively. It is understood by both parties that these consultations will include permission by each party for the other party to verify, by mutually approved scientific methods the effectiveness of the safeguards and control systems applied to nuclear materials received from the other party or to fissionable materials derived from these materials.

The effect of this understanding is that both parties have emphasized the importance they attach to the principles of verification which will be applicable to both.

It is also understood that in the event of the establishment of an international safeguards and control system by the International Atomic Energy Agency, the United States and Euratom will consult regarding assumption by the Agency of the safeguards and control over the fissionable material utilized or produced in implementation of the joint program.

Continuation of the joint program will be contingent upon Euratom establishing and maintaining a mutually satisfactory safeguards and control system which is in accord with the principles originally agreed upon.

Chairman DURHAM. Are there any questions?

Senator ANDERSON. Mr. Floberg, does the language of the agreement as you see it give this Government the right to inspect facilities erected by Euratom?

Mr. FLOBERG. I don't know if I have your question completely in mind, Senator, but the agreement and the exchange of letters explaining the agreement seem to give us the right to audit, for want of a better word, the compliance with the standards set forth in the agreement.

Senator ANDERSON. You used the term "audit"; do you think it gives us a right to see the books?

Mr. FLOBERG. It certainly does, and it gives us the right to weigh, assay, and count and otherwise verify. I apologize for that word "audit." It is not a very good one. But I think it is comprehensive enough if you don't hold to it too literally.

Senator ANDERSON. In the letter from Mr. Kohmstamm:

> I wish to confirm the understanding of the Euratom Commission that the consultation and exchanges of visits agreed upon in the reverenced section and the assurance provided for therein include within those terms permission by each party for the other party to verify, by mutually approved scientific methods, the effectiveness of the safeguards and control systems applied to nuclear materials received from the other party or to fissionable materials derived from these nuclear materials.

There is onthing there about seeing the books, is there?

Mr. FLOBERG. I certainly think that is included in those words, Senator.

Senator ANDERSON. You say you think it is included in those words?

Mr. FLOBERG. Yes, sir. That is an approved method, an approved scientific method, to look at the books.

Mr. RAMEY. The source of fissionable accountability records; is that what you mean?

Mr. FLOBERG. Yes, that is what I am talking about.

Mr. RAMEY. Have they developed a system in their negotiations to date as to what kind of a system they are going to adopt?

Mr. FLOBERG. I would doubt it. I would doubt that they have gone that far. This is something that will evolve.

Senator ANDERSON. Would you think that this language would give them permission to come to this country and check completely into what we have done with plutonium, as to what has gone into weapons and what has not, or does this confine them to following their own product?

Mr. FLOBERG. Their own product, Senator.

Senator ANDERSON. How can they tell what happens to it, unless they know what happens to similar material, the plutonium that we put into weapons?

Mr. FLOBERG. They can follow their own material, I believe. This will be segregated and it will be managed in a way so that they can follow it.

Senator ANDERSON. And we can go there and check to see that all the fission products that they have produced are properly accounted for in audit to this country?

Mr. FLOBERG. Are properly accounted for, and thereafter properly handled. They might not be brought to this country. They might go to the International Agency, for example. But the answer to your question is "Yes"; we could see that they are properly accounted for and appropriately utilized, and that means only for peaceful purposes.

Senator PASTORE. How do you tie, Mr. Floberg, from a legal point of view. Here you have the sovereignty of six nations. Their agreement runs to an entity known as Euratom, which is not a nation. It is a combination by way of agreement. Do you think that this is binding upon the individual nations? How does that come about?

Mr. FLOBERG. I think it is binding upon the individual nations because of the treaty relationship between them. There is a sort of implicit supremacy clause.

Senator PASTORE. As a matter of fact, the source of the authority springs from the treaty that creates Euratom?

Mr. FLOBERG. That is correct.

Senator ANDERSON. You could not give us a reference to a portion of that treaty which has to do with this disposition of materials? I say that because I have been trying to find the financial section that showed me about the guaranty. We are going to have a memorandum on it, of course.

But I think if you would read the financial section, you would need an interpreter to tell you how that tied in with any financial obligation as an individual nation. I just wonder if the same thing applies to this. If you read the language, it would be helpful, if you tell us what page you are reading from.

Mr. FLOBERG. Senator, let me refer you to page 60, article 77.

Senator ANDERSON. All right.

Mr. FLOBERG. It is of the treaty. I believe that covers it.

Senator ANDERSON (reading):

Within the framework of this chapter, the Commission shall satisfy itself that in the territories of member states ores, source materials, and special fissionable materials are not diverted from their intended uses as stated by the user.

That is not an obligation on Euratom. That is an obligation to the individual nation.

Mr. FLOBERG. The individual nations have signed this treaty, though. That puts them in the position of concurring in Euratom's enforcement of its rights.

Senator ANDERSON. They have no obligation. It is the Commission that has the obligation.

Mr. FLOBERG. That is an obligation on the members. You can't have one without the other.

Senator ANDERSON. It seems to me we belong to the League of Nations and so does Russia.

Mr. FLOBERG. The United Nations.

Senator ANDERSON. The United Nations, yes. I think sometimes Russia doesn't do all the things that the United Nations agreement calls for. You can have one without the other once in a while. Are you sure there is something about this that says you can't have one without the other? I don't find it.

Mr. FLOBERG. Senator, the whole chapter VII, as I glance through it, seems to me to set up an entire system by which the Euratom Commission exercises its power and authority to enforce the safeguards provision of the treaty. I say to you that the mechanism that is established here, the provision for sending inspectors and the provision for maintaining records and so forth is a reciprocal obligation, carries with it a reciprocal obligation, on the members of Euratom to comply therewith. You have said what is going to happen if they don't. That is what you have said.

Senator ANDERSON. I find words that say the obligation is on the Commission. But I don't find words that say there is an obligation on the members.

Mr. FLOBERG. Let me point to article 79. It says the Commission shall require the maintenance and production of operating records.

Senator ANDERSON. The Commission shall require.

Mr. FLOBERG. Shall require the maintenance and production of operating records. It seems to me that that means that the members

of Euratom are required to maintain and produce their operating records when the Commission requires it.

Senator ANDERSON. If it did, it would say the Commission shall require and the member nations shall provide records of maintenance and operation. It does not say anything about that.

Mr. FLOBERG. Senator, I say it says the same thing. That is my point.

Senator PASTORE. Is there any question in the minds of the representatives of Euratom who negotiated the agreement that is before us that they had the authority to do what we are talking about here now?

Dr. VANDER WEYDEN. There was no question on that, Mr. Senator. It is clearly an area where Euratom has the authority.

Senator PASTORE. And they so discussed that in their talks with you?

Dr. VANDER WEYDEN. Yes, sir.

Chairman DURHAM. Now how will we pass on the safety reactors in this section, this safety section, to safeguard and control. How do we do that? For instance, do we have some kind of a system like we have in our own Commission, what we call the reactor safeguards committee? How will we arrive at any conclusion that the reactor is safe? Is there anything in the agreement or anything in the safeguards?

Mr. FLOBERG. This has to do with the safeguards on the use of the material, Mr. Durham. This does not refer to the inherent safety of the devices. Safeguards and controls means safeguards to be sure that this is a peaceful program and nothing else.

Mr. RAMEY. This is a related question of what standards and principles are established with respect to the operation of reactors from the safety standpoint?

Mr. FLOBERG. I don't think that those questions are related. That is quite a different question, it seems to me.

Mr. RAMEY. That is right.

Chairman DURHAM. Well, since they don't have any third party liability, it would revert to the seller of the reactor? What I am trying to get at here is whether or not we are going to have some kind of an inspection team, or whether we are going to have somebody that says whether the reactor is safe or not safe, or will we just take a chance on them.

Mr. FLOBERG. Let me refer you to article I on page 22 of the Joint Committee print, article I of the Agreement for Cooperation. It says:

> The projects will be selected in accordance with technical standards, criteria, including those relating to radiation protection and reactor safety and procedures developed by the United States Atomic Energy Commission—

and the Commission for the Euratom Community.

Chairman DURHAM. Then you will have something to do with the safety of the reactor.

Mr. FLOBERG. The standards are clearly ones that must satisfy us, yes, sir.

Mr. RAMEY. Do you have any arrangements on how you will develop these safety standards, or are other arrangements referred to in the article which you quoted?

Mr. FLOBERG. Do you mean do we have an implementing agreement on this?

Mr. RAMEY. Yes.

Mr. FLOBERG. There may be something in the working papers on this, Mr. Ramey. Let me check quickly on this and see.

Mr. COOK. No. That is one of the things as soon as the program is approved, one of the first things that we would get together on, and that would be the Joint Board for the review and establishment of the criteria under which the reactors selected for the program would be considered as well as the criteria for the safety of the reactors.

Mr. RAMEY. Is that one the feature that is provided for in the Memorandum of Understanding about the Joint Board?

That is on page 15.

Section 2 is the selection and approval.

Mr. COOK. The spelling out of the Joint Board is not included in the Memorandum of Understanding, but it is the intent of the parties that such a board will be established for this purpose.

Representative HOLIFIELD. This would be a primary interest on part of the seller and the buyer of the reactors, to make certain they were getting a safe article, that the seller in particular would be alert to that fact. If there was a proper third party liability disclaimer as far as the United States Government is concerned, and they could be protected, and if the American manufacturer was as alert as I think he will be, his disclaimer would be in his contract with the private company.

Mr. FLOBERG. It is certainly to everybody's advantage.

Representative HOLIFIELD. It is to everybody's advantage, and it is to everybody's self-interest that the reactor be safe.

Mr. FLOBERG. There is no question about that.

Representative HOLIFIELD. And if the proper legal disclaimers are in there on the part of our statutory language, this does not become a legislative or legal concern, but becomes a human concern, certainly.

Senator PASTORE. Is there anything in this bilateral that would compel us to transfer one gram of U–235 unless we were satisfied as to the code and criteria established with reference to safety of a reactor?

Mr. FLOBERG. We certainly would not transfer it unless we were, Senator. The specific provision that would permit us not to do so is in article III of the agreement for cooperation, where it says we will sell—this is on page 23 of the committee print, in the middle of the page—where it says we will sell the uranium for use in projects designated by the parties.

That is one of the standards that will be applied in the designation of the project. Certainly it is one of the most important standards that would be applied.

Senator PASTORE. Of course, the elements of safety, the primary advantage and benefit of that is to the country where the reactor is located.

Mr. FLOBERG. That is true.

Senator PASTORE. We are not trembling with fear about a reactor blowing up in Milan, let's say. I would think that the Milanese would be more interested in that than we would be for the time being. It is to their advantage to have proper procedures to protect them

and their people. We have no legal responsibility insofar as the reactor, itself, is concerned, as to third parties, have we?

Mr. FLOBERG. No, sir; we have none. But we have the same basic interest to be sure that nothing happens to the Milanese that the Milanese have. Their interest is a little more direct, but it is no more sincere.

Senator PASTORE. And insofar as your bilaterals are concerned, all of these will be worked out to the mutual satisfaction of both sides.

Mr. FLOBERG. That is correct.

Chairman DURHAM. Are there further questions?

Senator ANDERSON. Let me just ask this: We signed these documents in Brussels on May 29. What has the Community been doing toward any of these goals? This is one of the goals they mentioned about setting this group up. The obtaining of legislation to hold harmless the United States was a goal. What has the Community been doing through its Euratom Committee in 2 months?

Mr. FLOBERG. In addition to getting their Commission and their Board to approve these documents——

Senator ANDERSON. No; this was signed on May 29 in their part of the world, was it not?

Mr. FLOBERG. Yes.

Senator ANDERSON. All those that signed. Since May 29 this has been nearly 2 months. What have you done in the 2 months?

Dr. VANDER WEYDEN. Mr. Senator, they have in the past 2 months been successful in assembling a highly qualified technical staff recruited from all of the 6 countries, which will be responsible for planning the research and development program. In addition, they also have a group of industrial and government people who will participate in the selection of projects under the program and help in the developing of criteria together with the United States.

Senator PASTORE. You are not familiar with what we have done in the last 2 months, are you? What have we done in the last 2 months?

Mr. FLOBERG. Prepare for these hearings.

Chairman DURHAM. If there are no further questions, go to benefits to be derived and urgency of the program.

Mr. FLOBERG. I would like to conclude my remarks by outlining the very important benefits that I believe both we and Euratom can expect from the program. I also would like to stress the urgency that we attach to obtaining affirmative congressional action during this session.

First I believe a program of the kind I have outlined is essential if Europe is to move ahead rapidly on a large-scale basis to install nuclear power. I seriously doubt that such a program will be launched unless the forms of cooperative arrangements I have mentioned are provided. I am convinced that the proposed method for encouraging industrial participation that has been developed is the most desirable and economical of the various alternatives that might be considered. We have every reason to believe that the incentives proposed will be sufficient to get the program underway.

Under the joint program there will be a close partnership and a pooling of European and American talent as well as an equitable sharing of costs and obligations. This will serve as an important counterweight to the events in the last year which have dramatized to the Western World the need for common, concentrated action in

order to face the challenge of rapid technological development from the Soviet orbit.

The program affords Europe and the United States an opportunity to combine their resources and talents to their immediate mutual benefit.

It also should serve to stimulate close working relationships between our respective industries.

Cooperation in research and development under the joint program which will be financed on a 50–50 basis should bring the very substantial scientific capabilities of Europe to bear on some of the major problems of reactor development. It is anticipated that at least one-half of the total funds made available for this program will be spent in the United States.

The data obtained will be made available to the industries in Europe and the United States to their mutual benefit. The Europeans will benefit considerably since they will be provided with invaluable experience and the results of years of nuclear power development in the United States.

The experience gained will furnish them with the confidence they need to move ahead on a broader basis. The United States, in turn, will gain immeasurably by having an opportunity to test its technology in a large-scale program of commercial application. It is expected that the moneys spent for United States equipment and services will at least be equal to the United States line of credit of $135 million.

In helping Euratom achieve its target we will be providing our firms with production experience, and data on capital and operating costs in a greater volume than would be possible if they were to rely solely on the existing domestic and foreign markets. American firms will gain experience that might be a longer time in coming within the United States because of the comparative cheapness of our conventional sources of energy.

If Europe goes ahead with a program on a scale comparable with the one contemplated by the "three wise men" it will provide the largest single proving ground and market for nuclear equipment now in sight.

The resultant increased opportunities for our industries cannot be overestimated. Their participation in the program will give them experience in producing nuclear equipment and testing its operation on a large-scale basis.

This will enhance their overall ability to meet other needs, including the domestic demand in this country which will increase as time goes on. It should be recognized that, over the long term, the Europeans are expected to manufacture an increasingly larger proportion of the reactor components themselves, in many cases under license arrangements with American firms. Inasmuch as the proposed program will stimulate contacts between American and European firms it should provide an important foundation for these future licensing arrangements.

Notwithstanding the important reactor projects already underway in the United States the mere existence of 5 to 6 additional large-scale power reactors operating on a commercial basis certainly will be of inestimable value in achieving economic nuclear power in the United States and Europe.

The construction of several large-scale reactors of the same type (including those to be constructed in the United States) should provide statistically significant data on the performance of fuel elements and major components.

These data should provide the basis for achieving substantial reductions in costs of nuclear power through improved reactor and fuel performance, as has been the case in our production reactor program.

The development of the ancillary industries which would be stimulated into existence by the program also would have a profound influence on lowering costs. The history of reactor development has demonstrated that the scaling up of the capacity of a reactor and improvements in design can reduce costs significantly.

Similarly it is to be expected that the construction of a number of reactors will lead to rapid improvements in rating and the fuel cycle, thereby reducing costs substantially.

In the United States we are concerned with the development of more advanced reactors that promise to be competitive, in the long term, with conventional power in this country. At the same time we are confronted with the pressing problem of developing reactors which can be immediately competitive in the power-hungry areas of the world. This is a heavy burden for any country and a difficult task to achieve on one's own. The Europeans in turn will not be able to reach their projected goals without our assistance.

By combining our talents and resources in a joint program we each will be able to make greater progress than otherwise would be feasible if we went our separate ways.

Lastly, I believe that the program will have an important effect in stimulating the solution of other problems such as insurance, third-party liability, and the establishment of common health and safety regulations.

The Department of State has stressed the urgency of moving ahead this session of Congress because of important foreign policy considerations.

I can only reiterate the need for early favorable action and state that I doubt that the desired objectives will be realized on time unless such affirmative action is forthcoming.

As a first step, Congress is being requested to approve the international agreement which has been executed pursuant to section 124 of the Atomic Energy Act. Concurrently Congress is being requetsed to adopt the proposed bill entitled "Euratom Cooperation Act of 1958." To assure prompt initiation of the program, section 8 of the proposed act provides that the Joint Committee may, with regard to the agreement for cooperation, waive the 30-day period prescribed by section 123c of the Atomic Energy Act of 1954. We propose to execute the agreement for cooperation subsequent to the approval of the international agreement that already has been submitted for congressional approval by the President.

I believe that the program that has been developed would give great strength and life to to Euratom, contributing at the same time in a most important way to the solution of Europe's threatening energy situation. The Western World is looking for methods to strengthen our cooperation. The execution of a joint enterprise in the interest

of both partners would give a most instructive and concrete example of what can be achieved through such cooperation. The execution of a joint enterprise in the interest of both partners would give a most instructive and concrete example of what can be achieved through such cooperation. Bold and creative action would thus give clear expression to the very real community of interest which exists between the United States and the emerging United States of Europe.

Chairman DURHAM. Thank you very much, Mr. Floberg.

Are there any questions?

Senator ANDERSON. Are we going to return to this financial question that we were to have a statement on?

Chairman DURHAM. We can do that, if there are no questions on this statement. It will be all right to return to that.

Mr. FLOBERG. I would like to say, Mr. Durham, that, as far as time is concerned, and this is in response to Senator Anderson's statement yesterday, there is no doubt that the chestnuts are in the fire. You just have to look at the calendar to see that. No matter who put them there, the Joint Committee has the real opportunity, and the Congress has the opportunity, to get them out of the fire. If they do, this program will be a monument to the Joint Committee and to the Congress that will take a very favorable position alongside other monuments in this Joint Committee's wardrobe.

Senator ANDERSON. I might also say that the chestnuts are also in the fire for the Atomic Energy Commission. It could have won praise and gratitude if it got the chestnuts out of the fire, too. It has this document signed in Brussels on May 29, and get it to us on June 23. There is no reason why we could not have been considering all of the essential phases of it. It was held up to add a few little lines with reference to the inspection matter, and, when we got the few, I don't think we got much out of the inspection. It says they can peek a little at us and we can peek at them.

Mr. FLOBERG. It is too late for us to get the merit badge, but not too late for you to get it.[1]

Senator ANDERSON. You want us to waive a 30-day provision that has been put in the law so that we would have a chance to study these things.

If we do, there will never be another one that comes up here if it isn't here on about the 29th of July if we adjourn on the 30th, and you will say, "Now, waive the 30 days in a hurry." We put it there so we could hold onto it. If the Atomic Energy Commission had moved us on the 29th of May, the 30-day problem would not have arisen.

Senator PASTORE. I have every confidence that maybe we can act, and act with expedition. I am a little fearful as we look at the calendar, as there is talk that we might adjourn around the 9th or 10th of August. Of course, with the way it is, no one can tell just when it will be. But assuming it is August 10, and here it is the late part of July, my experience is, even for the President to sign some of these agreements, that takes several days, too, unless he is ready with pen in hand to sign this international arrangement under section 124. But you must admit that there isn't a great deal of time, and that it would mean that we would have to drop everything else and work

[1] See Mr. Floberg's correction of this under separate letter to the Joint Committee (p. 247).

on this. I am perfectly willing to do that, but it will be a monumental job, if we do get it out.

Mr. FLOBERG. And I will stand on the pinnacle of the dome of this building and to all the world say, "What a good job has been done," if that is achieved.

Senator PASTORE. You are not only a good Commissioner, but you have become a good diplomat in the past few hours.

Senator ANDERSON. You will find it a little slippery up there.

Representative HOLIFIELD. I am more interested in the epitaph than I am in the monument.

Senator ANDERSON. Was there an opportunity to check the financial situation?

Mr. FLOBERG. I think I can give you a little more thought on it.

Senator ANDERSON. Can I follow with the citations?

Mr. FLOBERG. We must be talking about different questions.

Chairman DURHAM. Are you going over appendix A, or do you just want that considered for the record?

Mr. FLOBERG. I beg your pardon?

Chairman DURHAM. I say, do you want to consider appendix A?

Mr. FLOBERG. I would just like to submit that, Mr. Chairman. It is not difficult to read that part and, if you would like me to read it, I will. I thought it might be satisfactory to leave it in there for the record. Appendix B is quite difficult to read. Appendix A, I can read, if you would like me to do so.

Chairman DURHAM. That is not even under consideration by the Commission at the present time; is it?

Mr. FLOBERG. All this is, is an analysis. It is meant to be of assistance to the committee. It is not really testimony. It shows what we could have done if we had taken a different course of conduct.

Chairman DURHAM. Without objection, we will place it in the record.

(The document referred to follows:)

APPENDIX A. COMPARISON OF ALTERNATE APPROACHES CONSIDERED

In arriving at its position with regard to offering incentives to Euratom utilities through the fuel-cycle-guaranty procedures, the Commission gave serious consideration to other methods under which the objectives of the program might be met. Among these were such ideas as developmental allowances toward the research and development necessary to develop satisfactory fuel cycles for specific reactors; plutonium would be purchased for extended periods under the same terms and conditions offered domestically; procedures under which the Euratom reactors would be considered as units in which entire fuel loadings, furnished and paid for by AEC, would be tested, with the utility paying a predetermined price for the steam produced; procedures under which the AEC would waive all use charges for extended periods of time. In addition to these ideas, and numerous variations of them, the Commission also considered ideas proposed by the Euratom working party. These were essentially schemes under which the Euratom utility would pay the AEC a fixed price for steam produced and AEC would furnish fabricated fuel and take irradiated fuel back.

The discussions held by the Commission and Euratom clearly indicated that, from the standpoint of the Euratom utilities, an essential feature of any joint program which would have a reasonable chance of success would be the elimination of as many of the cost uncertainties as possible. The establishment of some sort of a ceiling was more important than the magnitude of the actual cost of power from the units, provided this cost were not unreasonably higher than that of conventional power.

Such proposals as fuel-charge waiver, capital subsidy, developmental allowances, fuel lease, payment for plutonium for unrestricted use, etc., while having a positive and measurable effect on the total cost of power from the reactors, failed completely to eliminate the greatest uncertainties in cost of power from nuclear plants; namely, the cost of fabricating fuel elements and, more importantly, their expected life.

When considered from the standpoint of the Commission and the United States industry, an extremely important feature of any program would be minimum governmental interference with the normal pattern of relations between United States reactor and fuel fabricators and the European utilities participating in the program. Those proposals under which the AEC would furnish the fuel and the utility would pay a fixed price for the heat or steam produced, while meeting the objective of removing a major cost uncertainty, do not meet the equally important objective of minimum governmental interference. All fuel fabrication and reprocessing would be an AEC responsibility. The Government would be in the middle throughout the entire program. Normal industrial relations could not come to bear.

The procedure proposed has the feature essential to making the program go; namely, elimination of the uncertainties of fuel-fabrication costs and fuel life. At the same time, it requires only the minimum governmental intercession necessary to achieve the objectives of the program, and provides for elimination of governmental action the moment such action is no longer necessary. It will allow all the normal industrial relations to exist and will impose the least amount of governmental control to establish the guaranties.

An added advantage of the proposed scheme over those such as fuel-charge waiver, capital subsidy, higher plutonium prices, etc., is that under the proposed program of fuel-cycle guaranty the governmental costs are only contingent costs, whereas under the other schemes there are positive costs. The magnitude of the costs under the proposed fuel-cycle program will be determined by the success of the extensive joint developmental program which AEC and Euratom will undertake and of the experimental and operational programs which United States industry, with the normal incentives of competition, will carry out. The probability that fuel costs will reach levels equal to or lower than those guaranteed by the United States and that fuel life will be greater than that guaranteed, is thought to be sufficiently great so that total AEC costs under this program should be considerably less than under any other scheme which might achieve the desired results.

Mr. FLOBERG. Appendix B, I am assuming, goes into the record also, Mr. Chairman.

Chairman DURHAM. Yes.

(The document referred to follows:)

APPENDIX B.—*Qualitative comparison of assistance offered domestic and Euratom utilities*

	Euratom	Domestic [1]
1. Fuel inventory	During first 10 years of operation Euratom pays 4 percent interest on value of inventory; during the next 10 years Euratom pays principal plus interest on unpaid balance; no waiver of charges.	Utility pays a use charge of 4 percent of value of inventory; under PDRP [2] this may be waived for 5 years of operation.
2. Fuel burnup	Pays United States published charge.	Pays United States published charge.
3. Fuel element fabrication (and life).	Maximum fabrication costs and minimum fuel life guaranteed for specified elements for 10 years of operation; guarantees limited to 1,000 electrical megawatts program.[3]	Generally, no guaranties by AEC; research and development on specific fuel for specific reactors supported under PDRP II (c) maximum fuel cycle cost guaranteed under PDRP I (c) contract with CPPD.[2]
4. Chemical processing	Pays United States published charge; guaranteed for 10 years of operation that charge will be prorated if fuel elements fail below AEC guaranteed life.[4]	Pays United States published charge; CPPD [2] charges included in fuel cycle costs as guaranteed.
5. Transportation of spent fuel elements.	Pays actual cost; AEC guarantees for 10 years to prorate actual transportation charge from port in Europe to chemical processing plant in United States if guaranteed life not met.	Pays actual cost (transportation cost is considerably less than for Euratom).
6. Plutonium purchase	Market guaranteed by agreement for 10 years of operation; the price offered is equal to fuel value established by United States (this figure is $12 per gram through fiscal year 1963).	Market guaranteed by law for life of reactor license (licenses now issued up to 40 years); price guaranteed under present law for periods not to exceed 7 years (prices guaranteed through fiscal year 1963 vary between $30 and $45 per gram for Pu for unrestricted use).
7. Operation and maintenance	No assistance	Generally no assistance; AEC responsible for "unusual maintenance" under CPPD's arrangement.
8. Capital cost	Export-Import Bank line of credit at 4½ percent interest for portion of capital.	Private financing (AEC takes title to portion of plant built with Government funds).
9. Research and development [5]	Joint AEC-Euratom 10-year research and development program be established for fuel and reactors built under 1,000 electrical megawatts program.	AEC assistance on preoperation and postoperation research and development under PDRP.
10. Liability insurance	Must depend on commercial insurance, or ad hoc consideration of his Government until a general European governmental solution (such as Price-Anderson bill) is developed. Euratom gives assurances in memorandum of understanding that it will take positive action to bring about resolution of this problem.	Has Price-Anderson bill.

[1] Under the 2d invitation of the power demonstration reactor program (PDRP II) the Commission owns the reactor and sells the steam produced to the utility. Essentially the Commission assumes all costs above that which the utility normally would expect to pay for steam from a comparable conventional plant. Commission is, therefore, responsible for items 1–8 in the qualitative comparison.

[2] CPPD=Consumers public power district.
PDRPI=1st invitation under power demonstration reactor program.
PDRPII=2d invitation under power demonstration reactor program.

[3] In cases where AEC guaranties are extended to Euratom, provisions are made for sharing decreases in costs which result if fuel exceeds guaranteed life.

[4] Intent of Euratom is to construct own chemical processing plant at an early date. AEC will offer technical assistance under joint program. Therefore AEC chemical processing and proration of transportation costs not expected to continue for the full 10 years of operation.

[5] Under the power demonstration reactor program the AEC has agreed to incur costs up to about $57 million for research and development work applicable to these projects, which will have a combined electrical capacity of some 436 megawatts. The utilities in turn have agreed to do research and development work estimated at $23 million.

Under the joint program, AEC and Euratom will, during the next 5 years, each spend approximately $50 million on research and development aimed at improving performance and operating characteristics of reactors of the type selected for construction under the 1,000 electric megawatt program. During the 2d 5 years of the 10-year program, it is expected that each will spend approximately $50 million more on useful research.

Chairman DURHAM. Appendix A and appendix B have been placed into the record.

What is the question, Senator Anderson?

Senator ANDERSON. We were going to have an analysis of how the member country was bound for any part of this money.

Mr. FLOBERG. That is what Mr. Metzger was working on. I don't know if he is here or not.

(Supplementary correspondence from the State Department and AEC pertaining to the subject will be found on p. 245.)

Senator ANDERSON. You had another statement, too.

Mr. FLOBERG. The point I was going to answer was either you or one of the other members of the committee this morning asked me what would happen if——

Senator BRICKER. If the Export-Import Bank did not make the loan.

Mr. FLOBERG. That was the second question. The first question I was going to answer that somebody asked me was what would happen if the Euratom group did not raise enough money to equal the total $215 million that we are telling about, but raised some fraction of that, however big a fraction.

I told you that off the top of my head I thought this would probably mean that we would walk away from this deal. Well, during the noon hour I thought a little more about that and we discussed it a little bit, and I think that answer was probably wrong. I think that the better answer would have been something like this: The $135 million that is contemplated as an Export-Import Bank loan is a complement to the raising of the $215 million by the Euratom group.

Assuming that some fraction of the $215 million is raised, then I assume or I think that it would mean that we would proceed on a pro tanto basis, and that we would wind up with a lesser program than we now have contemplated. In other words, I would think that we would have a half a program instead of a whole one, but I would think a half a program would better than none.

I think that is really a more responsive answer than the one I gave this morning.

Senator BRICKER. The Export-Import Bank if it makes the loan would scale it down in proportion to that which they failed to raise?

Mr. FLOBERG. Yes, sir. Because this would be put up, remember, the Export-Import Bank loan would be put up on a project-by-project basis. This is a line of credit that will be drawn against on a project-by-project basis, and I would assume that if the Euratom group did not raise enough money to proceed with all the projects contemplated, then the Export-Import Bank funds would not be available, except on an approximately corresponding basis.

Senator BRICKER. What is there in the agreement to guarantee or assure a situation of that kind?

Mr. FLOBERG. Well, the thing in the agreement is the fact that this is a project-by-project undertaking.

Senator BRICKER. The Export-Import Bank would look at each separate project as proposed?

Mr. FLOBERG. Yes, sir. I might point out that the loan is up to $135 million. That is the reason it is so contemplated, that it will be on a drawdown basis.

Chairman DURHAM. Let me ask you this question: Will you need any more money in this year to start this program for what you already have in AEC?

I am thinking about the situation you find yourself in, that although this is an authorization and your funds were voted last week by the Appropriations Committee, in my opinion you would not have much of a chance to get back before the Appropriations Committee this year for any funds, if you have to have them.

Mr. FLOBERG. The draft bill includes authorization and obligating authority, Mr. Durham.

Chairman DURHAM. That is true. But then you have to go to the Appropriations Committee after we get through with this if you need money to carry out the program this year. If you have some funds to start this program with down there, of course, you would not have to do it. But could you do it under this authorization power?

Senator PASTORE. I think what Mr. Durham is talking about is about the $50 million and your $90 million.

Mr. FLOBERG. Neither of those will become very significant in the course of this year. Those are both going to take some time to get going.

Senator PASTORE. It seems to me those are the only two places where you will have to put up any money.

Chairman DURHAM. That is true. But if you are going to start out to do something——

Senator PASTORE. I was merely trying to correct the record and clarify the record. That is all. You would not expect any obligations before the end of the fiscal year with relation to those two items, would you?

Mr. FLOBERG. No, sir, certainly not the fuel guaranty. That would not be significant until the fuel has been installed and has been operating and has been proved not to meet the guaranty. So it will be a matter of years before that matter comes up.

Chairman DURHAM. Will the Senator yield there?

Senator PASTORE. Yes, sir.

Chairman DURHAM. You have in your breakdown on page 31 of your proposed agreements the $2 million for expenditures this year, estimated expenditures.

Mr. FLOBERG. It might be possible for us to attach this to our appropriation bill which is now before the Senate, Mr. Durham.

I am not so sure about that. But we have gone on the belief that we needed this obligating authority.

You put your finger on a very critical problem, there is no doubt about that. I am informed that we do anticipate having this minimum amount of research and development expenditure here in the relatively near future. Within the fiscal year at least.

Chairman DURHAM. Well, I don't know you would have the money to spend this year to carry it out unless we passed the act. If you don't have the money to carry out what you intend to do over there, it might be a problem.

Mr. FLOBERG. It might be possible to transfer funds by appropriate arrangement with the committees concerned. I don't know. We would have to examine that, too.

Chairman DURHAM. You do have that authority?

Mr. FLOBERG. We do, but we exercise it with extreme caution, and always after informing the appropriate committees.

Representative HOLIFIELD. The only funds that you apparently are asking for is the $2 million.

Mr. FLOBERG. That is for expenditures, Mr. Holifield, but we do ask for $25 million of obligation authority.

Representative HOLIFIELD. Do you have to have that appropriated before you can obligate it, if it is authorized?

Mr. FLOBERG. That is what the regular route is.

Representative HOLIFIELD. Then you have to add that.

Mr. FLOBERG. Yes.

Representative HOLIFIELD. You would have to say that you need $27 million added to the appropriation bill that is before the Senate.

Mr. FLOBERG. We discussed this before both the Appropriation Committees, House and Senate, and I was the witness, and this specific problem was mentioned to them, that the Euratom proposal had not been included in the bill as presented to them.

Both Appropriations Committees understand this, and both Appropriations Committees realize that we will have to come back to them for the financing of the Euratom program.

Senator PASTORE. Here is the problem here, Mr. Holifield, inasmuch as the legislation before us is the authorization, how are you going to get the appropriation before the authorization?

You wouldn't get this authorization much before the end of this session, if you get it at all.

How are you going to get the appropriation before you even get the authorization?

Mr. FLOBERG. You can't. That is the reason we have not submitted it to the Appropriations Committees, but we have alerted them to it.

Senator PASTORE. How do you establish the legal authority to transfer the funds if it becomes necessary to use these funds?

Mr. FLOBERG. Well, we will reserve that. I believe that we have the authority if all the properly concerned committees are consulted. Of course, we would have to have it allocated by the Bureau of the Budget, and so forth, follow the usual steps. But I believe we have the authority, provided something else gives.

Senator PASTORE. You have already said that maybe half of the $100 million that is going to be allocated in the next 5 years for research and development will be spent here in the United States. You said that.

Mr. FLOBERG. That is correct.

Senator PASTORE. Therefore, you would have existing facilities where if you had the money you could begin to explore this research and development.

Mr. FLOBERG. That is correct.

Senator PASTORE. You might need that money first of all. It strikes me that you could not do very much with reference to money, when you can't transfer and you don't have the bill until some time the first part of next session.

Mr. FLOBERG. That is correct.

Representative HOLIFIELD. I doubt very much if this agreement will be consummated on the part of the European people before the first of the year, and I doubt very much if there is any need for any funds this year.

Senator PASTORE. I question that, too. I am perfectly willing to admit that. I admit this, that I would be the first one to wonder whether or not you can actually set this all up and get it ratified by our Euratom governments much before January. I question that.

Mr. FLOBERG. I believe they are prepared to go forward immediately.

Chairman DURHAM. They can tell us the same thing and we will tell them the same thing, that we have no funds.

Senator ANDERSON. Mr. Chairman, there are a great many things in this testimony that do deal with legislative policy.

A suggestion was made this morning and if the witness answered improperly, he should correct his testimony and change it.

I would certainly like to suggest that the record of this hearing be not corrected except for obvious grammatical errors, and if there is a change in testimony it be submitted subsequently as a change in testimony. If we ask questions and depend upon a certain answer and then the people editing the testimony can go back and completely change the words, we might ask some additional questions.

Mr. FLOBERG. I will tell you how I will correct my testimony, Senator. I will write a letter and point out that on page such and such I said such and such, and I want to change that answer as follows.

Senator ANDERSON. That is what I would like to have done, that we make a record of that nature. I do think it is not so important sometimes on authorization legislation for a reactor program or a building program, because we pretty well know what we are talking about, and generally we can revise the language later on if we need to. But this has pretty heavy legislative history implications and I do think it ought to be pretty well untouched.

Chairman DURHAM. With that understanding, we will proceed on that basis in correcting the record.

Are you through with this?

Senator ANDERSON. We had a financial question that Mr. Metzger was going to deal with.

Chairman DURHAM. I wanted to ask Mr. Vance a question.

Do you have a statement to make, Mr. Vance?

Mr. VANCE. No, sir; I have not, Mr. Chairman.

Chairman DURHAM. Any comments?

Mr. VANCE. No, sir.

Chairman DURHAM. All right.

Now, we will find Mr. Metzger.

Mr. SCHAETZEL. Mr. Metzger is not here.

He was going to submit the information in a written document. That is why he is not here now. Was this a misunderstanding, Senator? This was the sense that he got from your inquiry, that you wanted it, you would like to have it, this afternoon, but you did not press him for it this afternoon.

Senator ANDERSON. I am glad we are not going to revise the record. I asked if he would have it here by 3 o'clock. But that is all right. We will not worry about it now.

Could you tell me what article 215 meant in the treaty? It says initial research and instructional program which is set out as annex V of this treaty and which may not exceed 215 million EPU units of accounting.

What is an EPU unit of accounting?

Mr. SCHAETZEL. The United States dollar.

Senator ANDERSON. A dollar, really?

Mr. SCHAETZEL. Yes, sir; a dollar.

Senator ANDERSON. Why does it say EPU units of account? Why don't they say dollars?

Mr. SCHAETZEL. It is in connection with the European Payments Union, Senator, which arose out of the Marshall plan, a clearing system within Europe. To get a standard measurement they settled upon what they called an EPU dollar which is the same as an American dollar.

Senator ANDERSON. Then can someone tell me why this is called the research and instructional program when over in article 174 they list two types of expenditures. One has to do with administrative and safety and health and the other is research and investment. This is research and instructional.

Mr. SCHAETZEL. I think, Senator, this is probably a matter of translation.

You see, the English was not the language of the treaty. This was translated. We have had other objections as to the English version of this. I am advised it should be research and development rather than research and instructional.

Chairman DURHAM. Do you want this gentleman from the State Department up here?

Senator ANDERSON. When he can come.

Chairman DURHAM. Well, we cannot conclude the hearing today. We have industry to hear from, other witnesses to be heard, and other witnesses that we could not hear today because we have taken more time on AEC than we considered.

Are there any industry people here today that care to testify?

Is there anyone else in the room who cares to testify on this matter?

Senator ANDERSON. May we ask, Mr. Chairman, if they have submitted answers to the points raised by the General Accounting Office?

Mr. FLOBERG. Yes, sir; just before you came in this morning I transmitted a letter to Mr. Durham that has those answers in it.

Senator BRICKER. Are there any extra copies of the treaty?

Mr. FLOBERG. We have a couple of copies of our own that we can give you.

Senator DWORSHAK. Are you going to continue this hearing, Mr. Chairman?

Chairman DURHAM. Yes; to next Tuesday. We have set aside next Tuesday.

Senator DWORSHAK. I mean, will we have an opportunity to question Mr. Floberg?

Chairman DURHAM. You can do that now.

Senator DWORSHAK. I have a few questions.

Mr. Floberg, on the first page of your statement, you refer to the formulation of this program and say that the Atomic Energy Commission held a meeting with a group of representatives of the United States Nuclear Industry to explain the proposed program of Euratom. Then you say:

> It was our impression that industry is in favor of the program.

I would like to have you tell us very briefly why you think that private industry interested in the development of nuclear power is

more interested in subsidizing through our Government the development of nuclear power in European countries than in displaying the initiative and resourcefulness that should be displayed here at home in helping AEC develop nuclear power for commercial purposes. Why do they prefer to transfer all of their interests and activities to Euratom rather than demonstrating more impressively than they have in the past few years their desire to develop nuclear power in the United States?

Mr. FLOBERG. Senator, this was not meant to be a comparative in any sense of the word. What this says is that on the basis of the conference that we had with industry representatives, although no vote was taken or anything of that sort—it was not that kind of meeting—but on the basis of our all-day session with them, it seemed clear to us that the sentiment of industry was very much in favor of this program.

Senator DWORSHAK. Does that appear logical to you?

Mr. FLOBERG. Yes, it does appear logical.

Senator DWORSHAK. We don't need to develop nuclear power in this country?

Mr. FLOBERG. I didn't say that.

Senator DWORSHAK. That's the natural inference a person would draw.

Mr. FLOBERG. No, I don't think so. This is not meant to be a comparative in any sense of the term. This is meant to be a criticism of the Euratom program, and I believe the criticism was favorable. There was no attempt to compare the relative merits of this with any domestic program.

Senator DWORSHAK. Well, you say on page 4 of your statement that the target for Euratom is the installation of 15 million electrical kilowatts in the Community within roughly a decade. It is my understanding that this initial program encompassed only 1 million kilowatts.

Mr. FLOBERG. That is correct.

Senator DWORSHAK. What commitments does our Government through AEC deliberations have for following through on the balance of the kilowatt program beyond 1 million?

Mr. FLOBERG. None whatever.

Senator DWORSHAK. And you expect to reach the target for the 1 million within 5 years?

Mr. FLOBERG. Well, this is a very tight schedule, but it is tight in the same way as is the Congress' schedule in passing on this proposed bill and the related documents. They are tight schedules but they are achievable.

Senator DWORSHAK. I would like to have you tell us briefly what contributions are being made by private industry under this proposed program. It is a little hazy in my mind whether Euratom represents private utilities, private industry, or six governments in Europe in the sponsorship of this program, financially and otherwise.

Mr. FLOBERG. Euratom has six members, each of which is a government. And there are no private members of Euratom. Euratom is an organization composed of six nations.

Senator DWORSHAK. To what extent do private utilities participate? Do they have a voice in the deliberations and decisions of Euratom?

Mr. FLOBERG. Only as relayed through the government members. They do not participate directly any more than private industry participates directly in the deliberations of your committee.

Senator DWORSHAK. This is a government-sponsored and supervised nuclear power program, then, in Euratom?

Mr. FLOBERG. Wait a minute, Senator. I think we are talking about two different things. The reactors and the powerplants that will be built will be built by utilties, public or private.

Senator DWORSHAK. What is the responsibility of Euratom, then?

Mr. FLOBERG. Well, Euratom is the focal point. The unity of the governments, that will fan down this whole program to the organizations which generate electricity under normal circumstances in the member countries.

Senator DWORSHAK. In other words, then, any contacts or financial obligations our Government through AEC is assuming through this proposed agreement will be reflected in dealings with the six nations included in Euratom, rather than directly with utilities which will be participating in this program?

Mr. FLOBERG. Well, the negotiations of our Government are with Euratom. It is impossible to assume that Euratom is in such a watertight compartment that the governments themselves are not acquainted with what is going on in there.

In fact, it would be absurd so to assume. It would be equally difficult to assume that the electric generating agencies of these countries would be insulated from the deliberations of Euratom. In fact, I would say if Euratom does not count on the advice of the utilities, public and private, concerned, they would be just as unwise as if this committee ignored the considerations of industry in this country.

Senator DWORSHAK. Can you tell us what contributions will be made by each of the six nations in Euratom toward the implementation of this program?

Mr. FLOBERG. By each of the 6 or by the 6 collectively?

Senator DWORSHAK. Well, they will act collectively through Euratom and use the prestige, then, if Euratom has such, to justify loans in this country, and through this cooperative agreement. But there are six countries which will benefit directly from this program. What direct contributions or investments will be made by each of the six countries in this proposed program?

Mr. FLOBERG. Together they are going to contribute the $215 million to the program.

Senator DWORSHAK. I don't want to know what they are doing together. I want to know, for instance, what will West Germany contribute?

Mr. FLOBERG. Well, the sum of all the parts makes up the whole.

Senator DWORSHAK. Or Italy or France?

Mr. FLOBERG. I can't tell you what the individual contributions are. I can tell you the sum of the parts. The sum of the parts is 215. How that is broken down, I don't know, and I don't know if anybody here knows.

Senator DWORSHAK. Who is going to assume the responsibility for raising the $215 million, Euratom or the countries in Euratom?

Mr. FLOBERG. Well, Euratom, the countries concerned, and the utilities that are going to construct the plants in question.

Senator DWORSHAK. Well, it seems to me this is another one of those one-sided international agreements. These six countries will

benefit directly, but they are not taking any chance or gambling in any way or making any direct contributions like the United States; are they?

Mr. FLOBERG. Yes, sir; that's where the $215 million is coming from.

Sentaor DWORSHAK. But you said that Euratom was going to finance it.

Mr. FLOBERG. That is where Euratom gets it; from those countries, and from the utilities in question.

Senator ANDERSON. And from banks.

Mr. FLOBERG. And from normal sources of capital supply.

Senator DWORSHAK. Then to what extent will these six countries be making a financial investment which will make it essential for them to make this a successful program? People are not interested in programs unless they have an investment. You know that.

Mr. FLOBERG. Yes. Well, I believe the capital investment is what is going to make it essential for them to succeed in this program.

Senator DWORSHAK. You think Euratom, then, is not just another one of these paper organizations like NATO, to presume to do a job that probably isn't done because, collectively, individual nations don't assume direct responsibilities which they can cast off or shove off on a collective agency?

Mr. FLOBERG. Well, I don't want to compare with any other agency, but I will say I don't think it is a paper organization at all, in the sense you are describing it, and I don't think it is a Ponzi-type organization in the sense that it was suggested this morning either. I think it is a real, honest-to-goodness organization.

Senator DWORSHAK. Of course, that is based on speculation.

Mr. FLOBERG. Well, it is my judgment, Senator; that is correct.

Senator DWORSHAK. If we are gambling, it is gambling with American dollars.

Mr. FLOBERG. Well, they are gambling with their dollars, too, or francs, or lire.

Senator DWORSHAK. What is the United Kingdom contributing to this program?

Mr. FLOBERG. They are not in this program. This is a United States-Euratom program.

Senator DWORSHAK. Will they be able to sell any parts of the nuclear powerplants to Euratom, or will that be a monopoly to the private plants in this country?

Mr. FLOBERG. Euratom has its own plans of going ahead with the United Kingdom in its overall program, and I would assume and hope that the United Kingdom succeeds in selling some reactors to Euratom countries.

Senator DWORSHAK. Euratom, when they have cash, they will go to the United Kingdom, and when they want to buy something on the cuff they will come over here and negotiate a loan to enable them to buy equipment from private companies in the United States? Is that what you see in prospect?

I am rather suspicious, because never has the United States gotten into any one of these collective agreements with countries abroad, so-called international agreements, where the United States did not carry the large share of the financial burden and the responsibility, and I wonder whether we are starting off on the basis of such a concept in this program.

Mr. FLOBERG. Well, we have a share of the responsibilities, and of the financial burdens here, too. I would not think of trying to say we did not. The point is, though, that I believe we are matched in this one case extremely well by the contribution of other countries, and I believe that we are going to get our investment worth out of it.

Senator DWORSHAK. To what extent is the United States responsible for encouraging and partially subsidizing the development of nuclear power in Europe as compared with the assumption of responsibility by the United States in providing oil or any other fuel for these Euratom countries?

Mr. FLOBERG. I think the cases are quite different, Senator. We are talking here about an infant industry. Oil is not such.

Senator DWORSHAK. Well, the nuclear-power industry is an infant industry in the United States and the private utilities don't seem to be much concerned. They say the power is much more costly than conventional power. What are we going to wait, 5, 10, 20 years from now, to build nuclear powerplants in the United States?

Mr. FLOBERG. I think that is precisely the difference between nuclear power in Europe and in the United States. The relative cost in conventional power in United States as compared to conventional power in Europe is so different that a production-type program in Europe makes relatively more sense than it does here.

Senator DWORSHAK. Well, the cost of producing everything, every business and industry, production of all kinds, in Europe, is much less than in the United States, because of the lower standards of living and the lower wage structure; is that not true?

Mr. FLOBERG. No, sir; it is not true. There are lots of things that cost more over there than they do here. It depends on the extent to which wage rates enter into the selling price of the item in question.

Senator DWORSHAK. Well, I don't want to take too much time, but I would like to have you, right at this point, summarize the financial obligations which the United States is assuming in this initial $350 million program.

Mr. FLOBERG. $350 million program? The total extent of the United States exposure to that capital item, that is what your figure is, is the potential $135 million loan, or I should say up to $135 million loan, that the Export-Import Bank would undertake. Once again I should correct my statement and say line of credit that the Export-Import Bank would undertake.

Senator DWORSHAK. Plus the power inventory.

Mr. FLOBERG. But that is not in the $350 million. The $350 million is the capital cost of this program.

Senator DWORSHAK. And we are assuming a commitment for only $135 million of that?

Mr. FLOBERG. Up to $135 million.

Senator PASTORE. Lending. Lending $135 million.

Mr. FLOBERG. Yes; this is a loan, not a gift.

Senator DWORSHAK. For what kind of security?

Mr. FLOBERG. That is up to the Export-Import Bank to work out.

Senator ANDERSON. That is what I have been trying to find out all day, Senator.

Senator DWORSHAK. Well, if you can't find out, none of us can find out. Maybe the AEC doesn't know, either.

Mr. FLOBERG. We don't know. But I will tell you this much; it will be adequate security, if we have anything to say about it.

Senator DWORSHAK. How much research will we provide the responsibility for; $50 million?

Mr. FLOBERG. Approximately $50 million; that is the figure.

Senator DWORSHAK. Over a 5-year period?

Mr. FLOBERG. Yes.

Senator DWORSHAK. How much is the responsibility, in terms of dollars, of providing fuel for this program?

Mr. FLOBERG. That is a ceiling figure of $90 million. But, if you want my personal opinion, the actual exposure on that will be half that, only.

Senator DWORSHAK. And we will be paid the going rates for that, or will that be a contribution? We are going to furnish the fuel, aren't we?

Mr. FLOBERG. I am told you and I are talking about different subjects. The question of the fuel inventory is your question. The answer to that is $100 million of fuel inventory, which we will be paid for.

Senator DWORSHAK. Over a long-term basis?

Mr. FLOBERG. Yes, sir.

Senator DWORSHAK. And with an interval during which we receive no interest or payments?

Mr. FLOBERG. No; we receive interest.

Senator DWORSHAK. You receive interest but no payments on the principal?

Mr. FLOBERG. We receive interest and payments for burnup, but we do not receive any payments on the principal until the 10th year; that is correct, until after 10 years.

Senator PASTORE. How does that work, when you say that?

Do you mean for what we actually deliver?

Mr. FLOBERG. That is correct.

Senator PASTORE. Of the 9,000?

Mr. FLOBERG. That is correct.

Senator PASTORE. We will receive interest on what we deliver plus payment for the burnup?

Mr. FLOBERG. That is right.

Senator PASTORE. And then they offset that by the reprocessing, what comes back in plutonium?

Mr. FLOBERG. That is correct.

Senator DWORSHAK. One more question, Mr. Floberg. To what extent will the United States and AEC be guaranteed an opportunity to purchase plutonium produced in these plants?

Mr. FLOBERG. We have the obligation to purchase such plutonium as not purchased by the International Agency or retained by Euratom itself.

Senator DWORSHAK. They have the option of determining how much plutonium, then, will be made available to the United States?

Mr. FLOBERG. Well, up to 4,100 kilograms, we would take it, Senator, at the fuel price.

Senator DWORSHAK. Do you have a guaranty of that amount?

Mr. FLOBERG. I beg your pardon?

Senator DWORSHAK. Do you have a guaranty that they will make that much plutonium available?

Mr. FLOBERG. No, sir.

Senator DWORSHAK. How much is the minimum amount of plutonium that will be made available to us?

Mr. FLOBERG. Zero.

Senator DWORSHAK. Zero?

Mr. FLOBERG. Yes, sir.

Senator DWORSHAK. Do you think that is a good deal?

Mr. FLOBERG. Yes, sir.

Senator DWORSHAK. You do. I have been hearing a lot of testimony before this committee that plutonium is something that this country is interested in, and which might justify the partial subsidization of a program like this. Now you tell us that the one opportunity we would have to procure plutonium might not be available.

Mr. FLOBERG. I agree with both sides of your question, Senator, but I point out that this plutonium is restricted to peaceful uses.

Senator DWORSHAK. I appreciate that. Plutonium to peaceful uses is valuable, too, in this country; is it not?

Mr. FLOBERG. It certainly is. That is the reason we are prepared to undertake the obligation to buy it.

Senator DWORSHAK. Euratom is an agency representing these six countries. Let's assume that there are developments, and in the past few weeks we know that conditions change very abruptly abroad; that some of the signatory countries in Euratom might have different objectives, and for some reason, nationalistic reason, determine that they are not interested in continuing the obligations of a specific country through the operations of Euratom. Then what would the situation be? Would the United States have to make a concession that a country might withdraw, or escape the obligations which it is assuming under this agreement, or, through Euratom, will the United States have absolute assurances that when we enter into this program, that we will not find some justification within a few years for the withdrawal of one or more nations of Euratom from this program?

Mr. FLOBERG. My only answer to that, Senator, is that these six countries have treaty obligations to each other. If one of them violates its treaty obligation, of course, that is going to raise a difficult problem. I don't believe that we have prepared ourselves for that contingency.

Senator DWORSHAK. You just assume that everything is going to go along smoothly. Just like in France, recently, we had quite an upheaval there. If a program like this had been in operation, and while the outlook now is quite promising, so far as De Gaulle is concerned in supervising the governmental affairs of France, some other course might conceivably have been followed.

Then what would be the situation so far as the United States is concerned under the agreement?

Mr. FLOBERG. As I read the agreement, Euratom is under the obligation to the United States, and it is Euratom's problem to worry about the falling off of its faithful.

Senator BRICKER. Will the Senator yield for a question.

Senator DWORSHAK. I am through.

Senator BRICKER. How many of the European countries have ratified the Euratom Agreement to the present time?

Mr. FLOBERG. All of them.

Senator BRICKER. By act of Parliament?

Mr. FLOBERG. Yes, sir; I believe that is correct.

Representative PRICE. He said European countries.

Mr. FLOBERG. I mean the six members. That is what you are referring to, the six member countries of Euratom?

Senator BRICKER. That is right.

Mr. FLOBERG. All six have ratified the treaty.

Senator BRICKER. By legislative action?

Mr. FLOBERG. By the action of their respective legislatures, yes, sir.

Senator BRICKER. One further question. How many countries signatory to Euratom have private utilities in the production of power?

Mr. FLOBERG. I will have to get my experts to tell me about that.

Mr. SCHAETZEL. They all do, I understand, with the one exception of France, where the public utilities are nationalized.

Senator BRICKER. There are some other countries that have public utility power production, too?

Mr. SCHAETZEL. Some are mixed; for instance, in Germany, the bulk of them are private, some of them are municipal-private. They are mixed in the Netherlands, Belgium, and in Luxembourg.

Senator BRICKER. Are there any that have wholly private utility operations?

Mr. SCHAETZEL. I would say no, Senator. I think they all have certain public utilities as well as private.

Senator BRICKER. Even West Germany?

Mr. SCHAETZEL. Even West Germany.

Senator DWORSHAK. Then essentially it is a government-sponsored program.

Mr. FLOBERG. I don't think that follows at all.

Senator DWORSHAK. If they don't have private utilities in some of these countries, government would have to participate directly.

Mr. FLOBERG. Only in France is that true, that they have no private utilities.

Senator ANDERSON. I would like to say to the able Senator from Idaho that when we get the printed record he will find that I have some feelings that Euratom is a paper organization, and I am open to a lot of proof which I believe is forthcoming to make me change my mind.

I want to put into the record at this time the replies from industrial representatives in response to a questionnaire, dated June 28 and 30, 1958, that the Atomic Energy Committee sent out.

Without objection they will be put into the record at this time.

(The material referred to will be found in the appendix, p. 307.)

Mr. FLOBERG. Senator Anderson, if you are putting questions and answers into the record, could I ask that our questions and answers that we submitted be put in?

Senator ANDERSON. At the conclusion of your testimony, I thought Congressman Durham put the questions in. In case he did not, I will ask permission that at the conclusion of the testimony by Commissioner Floberg, the chart of questions and answers prepared by the Atomic Energy Commission be put into the record. Without objection it is so ordered.

(The document referred to follows, together with the following materials submitted by AEC: A comparison of the Safeguard Pro-

visions of the Euratom Agreement, and those contained in a typical U. S. agreement for cooperation; a summary of funding joint United States-Euratom cooperative program; examples of the fuel cycle guaranty.)

QUESTIONS AND ANSWERS CONCERNING THE EURATOM PROGRAM

1. Question. Why was it necessary to agree to a deferred payment arrangement instead of lease?

Answer. The United States was willing to lease enriched uranium to Euratom on the same terms and conditions as are available domestically. The Community, however, stated that at this time it was unable to lease special nuclear materials because, as a political and legal matter, under its treaty it must have ownership of special nuclear materials within the Community.

In order to retain the financial incentives provided by lease, but at the same time not undermine ownership which Euratom feels is essential to effective control, the proposed plan of deferral of payment for the initial inventory was developed. Euratom intends to lease to the utilities uranium purchased under terms comparable to those in this country.

2. Question. Under the proposed program, the United States essentially would reserve a very substantial quantity of special nuclear material, namely, 30,000 kilograms of U–235, for Euratom. Is Euratom under any obligation to actually purchase the quantity that has been reserved?

Answer. The fact that the United States would "reserve" 30,000 kilograms of U–235 for the program should not be construed to mean that this much material would be taken out of production channels and set aside for this purpose. The objective of reserving this amount of material is to assure Euratom, and Euratom utilities, that enriched uranium will be available as required to fuel the reactors in which they have invested large sums of their own money. The material will be removed from AEC production channels and transferred to Euratom only as required. The sales contract, under which the material will be transferred for each reactor, will contain a schedule of deliveries and returns which will obligate Euratom to purchase the quantities set forth in such agreements.

3. Question. Why is there a limitation on the end use of any plutonium which may be purchased from Euratom by the United States under the joint program?

Answer. The proposed joint program with Euratom is to be devoted exclusively to peaceful purposes. The restriction that has been placed in section 7 of the proposed "Euratom Cooperation Act" on the end use of the plutonium acquired by the United States is designed to further underscore the civil nature of the program and is in keeping with the President's announcement of November 18, 1956, which stated that, plutonium produced as a result of material furnished by the United States and purchased by the United States would be used solely for peaceful purposes.

4. Question. How much U–235 is involved in the joint program? Is this quantity really available?

Answer. For the entire 1 million kilowatt program, the total inventory will contain about 9,000 kilograms of U–235. The total inventory includes reactor loadings, material being fabricated, cooled and processed. The burnup will be about 1,000 kilograms of U–235 per year. For the 20 years of operation, a total of 29,000 kilograms of contained U–235 will need to be supplied for inventory and burnup. To this quantity is added 1,000 kilograms of U–235 for research and test reactors associated with the joint program, thus the total figure becomes 30,000 kilograms of contained U–235.

The U–235 will be made available, as required from current production, under determinations made by the President under section 41 (b) of the Atomic Energy Act covering allocations of U–235 to be made available for peaceful uses abroad. In making this determination, the President takes into consideration production capacity of the United States plants and the total requirements for this output.

5. Question. What assurance do we have that the proposed program of assistance will be sufficient to make the program go?

Answer. The assistance offered seems to meet the objective of giving reasonable assurance that the program will go. While it cannot be guaranteed that the incentives of the proposed program will be sufficient to assure that 1 million kilowatts will be installed, we believe they provide a basis for reasonable assur-

ance that the objectives of the program will be attained. They were developed after careful consideration by the United States and Euratom personnel of the extent to which European utilities should be willing to absorb costs greater than those estimated for new conventional plants. It was the consensus of the joint working party that on the basis of the assumptions used nuclear power would cost 1 to 3 mills more than power from conventional plants and that European utilities would accept such costs in meeting the objectives of the joint program, provided there was established a joint research and development program devoted to reductions in costs with the objective of reaching conventional costs at an early date.

6. Question. Are the assumptions and figures contained in the Wise Men report, A Target for Euratom, still sound?

Answer. The assumptions are still generally sound. Conventional power costs are presently somewhat lower than estimated in the report because of a decline in shipping rates for fossil fuel. The estimated nuclear power costs are also somewhat lower and more definitive than those given in the report. Mr. Armand, president of the Euratom Commission, indicated in a recent statement that there will be some delay in meeting the goal of 15 million EKW by 1967 given in the report. The proposed 1 million EKW joint program should be of material assistance in minimizing the delay.

7. Question. Will Euratom tend to favor public as against private industry?

Answer. Euratom's responsibility is to further the development of atomic energy within the existing framework of existing industrial organization in the member states. It has neither the desire nor the authority to alter this framework. Within the Euratom nations, the production of electrical power ranges from one extreme, exemplified by Germany where practically all of the power is produced by private utilities, to the other extreme in the case of France, where the production of electrical power is state controlled. Between these two extremes lies Italy, where both public and private power groups are strong. Euratom represents all countries and all factions. This should assure that neither public nor private power will dominate the nuclear plants. The memorandum of understanding recognizes this situation and makes it possible for both public and private groups to participate. Under the selection process, the United States will not participate in the selection of areas or sites. This is primarily an internal political subject which must be resolved by Euratom. It is interesting to note that during the 6 years of its existence, the Coal and Steel Community (an organization of the same six nations as Euratom) has worked with hundreds of coal and steel firms without bringing one company under government ownership. As Mr. Armand put it in a recent interview in Forum Memo of the Atomic Industrial Forum: "* * * To sum up, Euratom and the joint program will not socialize industry but will bring it help and assistance without modifying its present structure. * * *"

8. Question. What is meant by "proven type" reactors? Who will interpret the meaning of this phrase?

Answer. "Proven type" reactor is a reactor type which has been operated on a scale sufficiently large to give significant technical and operational data. Such operation will have shown that there are no major unsolvable technical problems, and that the reactor type is capable of reliable and safe operation and may be integrated into an existing power system. It is a reactor type which has been shown to be technically feasible and one in which the economic uncertainties lend themselves to resolution through the normal industrial process development techniques without dependence on major technical "breakthrough."

Under the terms of the memorandum of understanding, as further clarified by an exchange of memorandums between the heads of the Euratom and United States negotiators, it is clear that pressurized and boiling water types fall within the definition. It is further clear other types (such as the organic moderated concept) that may meet the criterion will be eligible for consideration under the joint program. The development of the precise criteria and the determination of whether a reactor is of a "proven type" will be the responsibility of the joint Euratom-United States technical board.

9. Question. What evidence do we have that an assistance program of this kind is really needed?

Answer. The development of a nuclear industry in most Euratom countries has been relatively slow, up to now, for lack of practical experience both in construction and operation of full-scale power reactor plants.

In order to speed up this development, it is necessary—

1. That the economic feasibility of nuclear power be proven, not by theory and calculation, not by extrapolation from pilot plant operation, but by full-scale operation of power-producing units on a scale large enough to assure statistical reliability of the data;

2. That the utilities into whose grid the power from these nuclear plants must flow become familiar with the technical and management problems of operating nuclear stations and accept, with confidence, nuclear powerplants;

3. That European equipment manufacturers gain knowledge and competence in the production of reactor components;

4. That the various service industries, such as fuel production and fabrication, scrap recycle, irradiated fuel reprocessing, etc., be developed as economic operations.

Traditionally conservative and bound by rate ceilings, the utilities are not prepared to take excessive risks or to invest large amounts of capital in plants in which the costs of energy produced may be well above that of conventional stations.

The fact that there is not already under way a program which would accomplish the objectives of the joint program speaks for itself. Discussions with Euratom and European utility personnel indicate that the estimated high cost of nuclear power from even proven type reactors and particularly the uncertainties of these costs would preclude a program under which 1 million EKW of American type reactors would be installed by 1963, unless additional incentives are provided.

10. Question. Aren't pressures for similar benefits apt to arise from other countries as soon as the program is announced?

Answer. In formulating the program with Euratom it was recognized that there may be certain other areas where the necessary conditions exist and the development of large-scale power reactors can be undertaken on a similar time schedule. Therefore it is believed that it may be in the interest of the United States, for technical and political reasons, to consider the establishment of a similar cooperative program to accommodate the special requirements of the International Atomic Energy Agency, individual nations, or other groups of nations. The specific needs for such programs have yet to be determined.

11. Question. How does the proposed program with Euratom relate to the agreements for cooperation which already have been negotiated with the various member states of Euratom?

Answer. Article 106 of the treaty which established the European Atomic Energy Community (Euratom) reads as follows:

"Member States which before the date of the entry into force of this Treaty, have concluded agreements with third countries for cooperation in the field of nuclear energy shall, jointly with the Commission enter into the necessary negotiations with such third countries in order, as far as possible, to cause the rights and obligations arising out of such agreements to be assumed by the Community."

This obligation on the part of the member states to negotiate with the United States to transfer their rights and responsibilities to Euratom was recognized at the time we were negotiating agreements with several of the member states. Consequently, our bilateral agreements with these countries recognize this possibility. For example, article II of the agreement for cooperation with West Germany reads as follows:

"It is recognized that article 106 of the Treaty Constituting the European Community for Atomic Energy (Euratom) which the Government of the Federal Republic of Germany signed in Rome on March 25, 1957, contemplates that member states of the Community will seek a renegotiation of existing agreements in the field of atomic energy with third countries once the treaty comes into force. If the treaty comes into force and if a cooperative arrangement is executed between the European Community for Atomic Energy and the Government of the United States of America, the Government of the United States of America would be prepared to arrange for the European Community for Atomic Energy to assume the rights and obligations of the Federal Republic of Germany under this agreement provided the European Community for Atomic Energy could, in the judgment of the Government of the United States of America, effectively and securely carry out the undertakings of this agreement."

Therefore, at such time as it appears that Euratom is prepared to effectively carry out the undertakings of the agreements for cooperation and assume the rights and obligations, we would be prepared to enter into negotiations with the individual States to this end. It is not expected, however, that these negotiations

will be undertaken until Euratom has developed its longer range program which is to provide the basis for a subsequent comprehensive agreement with the Community.

12. Question: What is the relationship of the United Kingdom to Euratom? Why aren't they a part of the program?

Answer: The United Kingdom is not a member of Euratom but is a member of the European Nuclear Energy Agency. This is an agency of the Organization for European Economic Cooperation and it includes Austria, Denmark, Greece, Iceland, Ireland, Norway, Portugal, Sweden, Switzerland, Turkey, and the United Kingdom, as well as the six nations which now constitute Euratom.

There have been discussions during the past months as to the relationship of the Euratom members to the rest of the OEEC agency, and it appears likely that Euratom may participate as a group in certain ENEA projects.

The United Kingdom has appointed its representative to the European Coal and Steel Community, Sir William Mecklereid, as its representative to Euratom and has expressed its desire to begin discussions with Euratom with a view to formulating a cooperative agreement. These discussions have just been initiated and it is too early to say what this future agreement will contain.

The "wise men" report, A Target for Euratom, anticipated that the Euratom program would include the construction of gas-cooled reactors of the United Kingdom-type, as well as United States-type reactors. Therefore, it is recognized that the proposed program of cooperation with the United States represents only a part of Euratom's power program. It is likely, on a longer range basis, that the United States, the United Kingdom, and Canada all will work in cooperation with Euratom.

13. Question: What type of relationship is envisioned between Euratom and the International Atomic Energy Agency?

Answer. The relationship between Euratom and the IAEA, of course, is a matter for the two groups to decide. Euratom is interested in cooperating with the Agency and its representatives took the initiative which led to informal discussions with representatives of the IAEA.

In the development of the memorandum of understanding, the Euratom group requested that the following phrase be inserted in the memorandum: "* * * The Commission of the European Atomic Energy Community and the Government of the United States reaffirm their dedication to the objectives of the International Atomic Energy Agency and intend that the results of their program will benefit the Agency and the nations participating in it * * *."

In addition, the agreement for cooperation between the United States and Euratom recognizes that there will be specific cooperation with the IAEA in certain areas. For example, the agreement states: "* * * In establishing and implementing its safeguards and control system the Community is prepared to consult with and exchange experience with the International Atomic Energy Agency with the objective of establishing a system reasonably compatible with that of the International Atomic Energy agency * * *," and, "* * * In recognition of the importance of the International Atomic Energy Agency, the United States of America and the European Atomic Energy Community will consult with each other from time to time to determine whether there are any areas of responsibility with regard to safeguards and control and matters relating to health and safety in which the Agency might be asked to assist * * *."

14. Question. What is the urgency for congressional approval of the program during this session?

Answer. As the President stated on June 23, 1958, the executive branch attaches a great deal of importance to the proposed joint program and is most anxious to see it move ahead rapidly. There is a growing sense of urgency in the Community on the need to install a significant amount of nuclear power capacity in the next decade in order to stabilize Europe's dependence on conventional fuel imports. The joint program is considered a vital and urgent first step toward the realization of this broader objective. If 1 million kilowatts are to be installed under this program by 1963, a start should be made on firm planning and selection during the summer and fall of 1958. Construction should begin in early 1959. Thus, if the program is to move ahead fully on this schedule, it will be necessary not only to obtain approval of the "124" international agreement and the "123" agreement for cooperation, but also the enactment of the proposed Euratom Cooperation Act, which contains the basic authorities the Commission requires in order to carry out its obligations under the program.

It is highly significant, if not remarkable, that the Community has been able to adopt the joint program as its first major piece of business, particularly

since it only came into being on January 1 of this year. In the past few months Euratom has been very successful in mustering a mounting interest and enthusiasm in the European utility industry on behalf of the program.

There also has been a significant increase in interest in reactors of American design in countries (such as France and Germany) where this enthusiasm did not exist before. The net effect is that the Europeans are anxious to proceed with the program and the atmosphere is very favorable. Reactions from American industry have been equally encouraging. If, on the other hand, congressional action on the entire program is not taken during this session it is feared that the momentum that has been gained will be lost. It is quite likely that, in such an event, the Community itself would suffer a major setback during a very critical period when it is trying to get on its feet. In addition, the utilities involved might lose their interest entirely or shift their attention to reactors of other than American design, and the United States would lose its chance to be the first major power to closely associate itself with Euratom's program.

The memorandum of understanding and the agreement for cooperation contemplate that a select number of projects (such as Edisonvolta) in an advanced stage of planning would be eligible for consideration under this program. Some projects have been delayed so far in their efforts to move ahead because of high initial costs and uncertainties associated with the fuel cycle. The proposed program could be of considerable assistance to these projects, and other projects involving United States reactors. A postponement of final action until the next session of Congress would lead to further delays and could discourage European utilities involved from doing business with American industry.

In recent months the British press has been criticizing the Government of the United Kingdom for not having had the foresight to initiate a joint program of the kind that has been developed between the United States and Euratom.

The proposed program promises to result in immediate benefits of both parties. The sooner it is initiated, the sooner these advantages will be forthcoming.

15. Question. It appears that the proposed safeguard arrangements that have been agreed to by the United States authorities and Euratom represent a departure from the safeguard provisions contained in most of the "power" bilateral agreements for cooperation which have been executed to date. How do the provisions in the Euratom agreement compare with those in a typical power bilateral?

Does the United States still have adequate overall assurance that the material transferred to the Community as well as the special nuclear materials produced therefrom only will be used for peaceful purposes?

Answer. As the Department of State and the Commission have mentioned in their respective testimonies the safeguard arrangements formulated with Euratom were designed to explicitly recognize the Community's unique attributes, important responsibilities, and its capacity to establish a rigorous multilateral control system over the materials employed and produced in the program. We believe the arrangements agreed to are prudent and will provide us with ample assurance that the materials received from this country as well as special nuclear materials produced therefrom only will be used for peaceful purposes. In anticipation of this question the Commission's staff prepared a comparison of the arrangements incorporated in the proposed agreement for cooperation with Euratom with those contained in a typical power bilateral agreement for cooperation (appendix A) which compares the similarities and differences between the two approaches.

In summary, under the terms incorporated in the proposed agreement for cooperation the Community has agreed to set up a safeguards system according to a series of stated principles which have been fashioned in large part after those contained in the statute of the International Atomic Energy Agency. The agreement provides that this system must be mutually satisfactory to the Community and the United States. It is further provided that the United States will assist the Community in establishing this system and will provide continuing assistance in its operation. Provision has been made for frequent consultation over the course of the agreement so that the parties may be assured of continuing effectiveness of the system and its conformance to the agreed upon principles. Within these terms, it has been agreed that each party will have the opportunity to verify, by mutually approved scientific methods, that the other party's safeguard and control system, as it applies to nuclear materials

transferred to the other party or fissionable materials derived therefrom, is operating effectively. Lastly, continuation of the cooperative program is contingent upon the maintenance by Euratom of a satisfactory system.

In assessing the overall import of this arrangement, the Atomic Energy Commission and the Department of State believe it should be recognized that in the first instance it is contemplated that the Community and, not the United States, will be charged with the basic responsibility for assuring that the materials involved only are being used for peaceful purposes. At the same time the arrangements will provide the United States with ample opportunity to verify that the agreed upon system is functioning effectively, without any less assurance to the Commission that material subject to control under the agreement will be utilized only for peaceful purposes.

16. Question. Do the safeguard arrangements provide us with essentially the same rights that we have in the existing bilaterals?

Answer. If by rights one means—has the United States the express unilateral rights accorded the Commission under a typical power bilateral, the answer is "No." On the other hand, if one means by rights—that the United States has ample opportunity to assure itself that material is being used solely for peaceful purposes, the answer is "Yes." This difference recognizes the Community's special status and broad responsibility, under the Euratom agreement.

Briefly summarized, the provisions of the Euratom agreement in this regard are as follows: (1) The safeguard system to be established by Euratom must be in accordance with the principles which the United States and Euratom agreed to. (2) This system must be mutually satisfactory. The parties have agreed that the United States will provide assistance in establishing this system and will provide continuing assistance in the operation of the system. (3) It is further agreed that there will be frequent consultations and exchange of visits by the parties to give assurance that the Community safeguards system effectively meets the principles agreed to and that the standards of the material acceptability system of the Community and the United States have kept reasonably comparable. (4) Within these terms it has been agreed that each party will have the opportunity to verify, by mutually approved scientific methods, the effectiveness of the safeguards and control system established by the other party as it applies to nuclear materials transferred to the other party. (5) Lastly, continuation of the cooperative program is contingent upon the maintenance of Euratom of a satisfactory safeguard system.

The United States perhaps could take the position that an interpretation of this agreement permitted the United States to approach Euratom on the basis of establishing a review system similar to that contemplated under bilateral agreements. However, this would not give a complete or accurate picture of the relationship envisaged. A review of the comparison and the history of the negotiations would clearly indicate that the provisions were drafted with a view that it is basically Euratom's responsibility to establish and administer the safeguard system. The provisions relating to visits and consultations were designed to give assurance to the United States and Euratom that this system would be effectively implemented and operated. In satisfying itself, the United States may verify the operation of this system by mutually approved scientific methods.

We are firmly of the view that the United States is in a position to adequately assure itself under the provisions of the Euratom agreement that material is being utilized solely for peaceful purposes.

17. Question. Does the memorandum of understanding provide that all of the so-called know-how, including manufacturing techniques, in addition to plans, designs, and specifications, which have been developed by American industry with private funds, must be made freely and widely available to European competitors?

Answer. One of the major purposes of the proposed program is to foster a close and continuing association between American and European industry. In formulating the program it was recognized that normal commercial relationships would have to be preserved, wherever possible to encourage industrial participation. Accordingly, the provisions of the agreement do not provide for any mandatory exchanges of manufacturing know-how or techniques. Exchanges of this kind are expected to be the subject of licensing and other normal commercial arrangements.

With respect to plans, designs, and specifictaions it was recognized in preparing the agreement that the program, in large part, was being proposed to provide Europe with a technological foundation, based partially on United States experience, for a longer range nuclear power program. Of equal importance, it

was designed to afford United States industry with the invaluable opportunity to "prove out" its reactors, on a large-scale basis, and obtain from the European utilities operating and cost information on these reactors. Accordingly, if the desired benefits were to be realized, on a wide-scale basis, it was agreed that there would have to be a reasonably free and reciprocal exchange of information under the program. It was recognized that such an exchange, in fact, would be indispensable to the review of the reactor proposals submitted as well as the administration of the program, including the fuel cycle guaranties. Thus, for example, article VI, A–1, of the agreement for cooperation provides that:

"Under mutually agreed arrangements * * * all nonpatentable information developed in connection with the selective projects, concerning designs, plans and specifications, construction costs, operations and economics will be delivered currently to the parties as developed and may be used, disseminated, or published by each party for any and all purposes as it sees fit without further obligation or payment."

While this provision contemplates that information developed by American private capital will be disseminated under the program, it is felt that the terms are sufficiently flexible to assure that the exchange will be administered in a manner which is consistent with the objectives of this joint program. It also should be noted that information of this kind normally is made available to the purchasing utility and that, in the overall, it is our belief that American industry will be gaining an ample return in the form of significant cost and operating data.

18. Question: What will the United States patent policy be with respect to American fuel element fabricators through whom the AEC extends fuel element guaranties?

Answer: The Commission has not determined what patent rights, if any, it believes it should obtain with respect to patents developed by manufacturers covered by fuel element guaranties. If the Commission decides to obtain any patent rights, such rights will be limited to use of such inventions and discoveries by the United States Government with respect to construction and operation of Government owned reactors. We believe this approach will assure that the Government obtains such rights as are necessary for its own needs and at the same time permit manufacturers to be in a position to license others to use such patents.

Section 152 of the Atomic Energy Act provides that any invention or discovery useful in the production or utilization of special nuclear material or atomic energy made or conceived under any contract, or subcontract, arrangement or other relationship with the Commission shall be deemed to have been made by the Commission. Whether or not this section would be applicable to fuel-guaranty contracts has not been determined. However, even if it were so determined the Commission would take such action under the waiver authority set forth in this section as would be consistent with the approach outlined above.

19. Question: Why doesn't the proposed deferred-payment arrangement relating to the fuel inventory provide for a downpayment by the Community at the time of initial delivery?

Answer: We have considered the possibility of requesting the Community to make a downpayment on the fuel inventory at the time of initial delivery. However, the objective is to keep the charges for enriched uranium comparable to those in the United States during the first 10 years of operation when the Euratom program will be getting underway. No downpayment on fuel inventories is required in the United States, where the material is leased to private users. The deferred-payment arrangement, outlined in the prepared statement, as a substitute for lease and is financially equivalent to lease during the deferral period. To require a downpayment for the Euratom program would upset the basis on which the fuel-cycle costs were estimated and would necessitate other compensating incentives to assure the success of the program.

20. Question: Was the program discussed with American industry before July 8, 1958?

Answer: The European Atomic Energy Community (Euratom) came into being on January 1, 1958 and the first formal meeting of the Euratom Commission was held on February 18, 1958. At this first meeting the Commission recommended the formation of a Joint United States-Euratom working party to develop plans for the joint program. This working party met in Luxembourg in March and in Washington in April and May.

It was considered inappropriate to discuss the details of the proposed program with United States industry until there was internal policy approval and until the program was submitted to the Joint Committee on Atomic Energy.

However, we did receive many comments and observations from United States industry prior to, and during the period of negotiations with Euratom, on the problems which were being encountered in attempting to sell United States reactors abroad, and this information was of considerable value in developing the program. In particular on December 31, 1957, the Commission sent a letter to representatives of the nuclear power industry requesting information on difficulties encountered in negotiating contracts for the sale of reactors abroad.

On July 8, 1958, we held a meeting with representatives of United States industry at which the proposed program was discussed in detail, and we believe it was favorably received by this group.

21. Question. The exchange of letters and the testimony make clear that the safeguard arrangements contain an element of reciprocity. Does this mean that we are undertaking a commitment to allow Euratom representatives to have acecss to United States classified information?

Answer. The agreement for cooperation does not provide for classified information to be made available to Euratom personnel. It does permit Euratom to verify that plutonium produced in reactors under the program and processed or purchased by the United States will be used for peaceful purposes only. The United States will make arrangements to permit such verification with respect to chemical processing and peaceful uses without any classified information being involved.

22. Question. What is the status of third-party liability and indemnity coverage, and what would be the effect of any delay in such coverage in meeting the 1963 deadline date?

Answer. In the prepared testimony there is outlined briefly the undertakings of Euratom with respect to this matter and their complete understanding of the need to solve this problem. As you know, the Euratom countries are members of the OEEC which currently has under consideration a draft convention which would deal with the third-party liability question.

OEEC experts have been working steadily upon the draft convention, having had meetings in January, March and this month. They will meet again in September and hope to be able thereafter to complete such a convention to be presented to the member governments. We believe this is a most heartening indication of Euratom's intention to deal expeditiously with this problem.

We have seen drafts of the convention and commented thereon. However, they are undergoing revision and further consideration. Basically, the convention would provide for liability in stipulated amounts on the reactor operations and adopt the approach that there would be no third party liability on the part of suppliers, including American suppliers, with respect to nuclear incidents arising in the signatory nations. We are aware, of course, that whatever form the convention may take there may still be some problems.

We believe, however, that the main thing to remember is that Euratom recognizes that a convention might not be the entire solution to this problem and that indemnification of such supplier might be necessary by Euratom, backed up by the member state.

It is felt that Euratom's undertaking under the agreement of cooperation to secure adoption by the earliest practicable date of suitable measures in this respect, coupled with the realization that the program may not proceed on the agreed time scheduled if the third-party liability problem is not solved, is a strong indication that it will be solved.

23. Question. How will the program be administered? What will be the relationship to the Department of State, the AEC, the ICA, and the Executive Office of the President in the administration of the joint program?

Answer. Both the AEC and the Department of State have been occupied with the substantive elements of the joint program and we, therefore, have not had time to work out the administrative arrangements needed to carry it out; a process which will require consultation with Euratom officials. The development of administrative arrangements is clearly the next step. We expect to have a preliminary plan of operation by the end of August, and discussions with Euratom officials in September.

We assume that certain major operating responsibility will have to be focused in Europe. The AEC intends to assign a senior representative to the Euratom headquarters, supported by appropriate technical personnel, who will work within the general framework of the United States mission to the three communities, which is headed by Ambassador Butterworth.

In view of the fact that no mutual-security funds are involved, the ICA is not involved in the administration of this program.

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With favorable action by the Congress on the program, the next phase is one of organization, to be followed by actual administration of the program. These are phases of executive operations outside the immediate interest of the Executive Office of the President, which is concerned with policy matters. Should major policy problems arise in connection with the joint program that requires the attention of the Executive Office, then presumably the normal procedures would be followed, namely, a joint recommendation by the Secretary of State and the AEC to the President for his consideration.

24. Question. What activities will be included in the research and development program?

Answer. The need for a well-developed extensive research and development program as a complement to the construction and operation of the reactors envisioned under the joint United States-Euratom program was recognized by the joint working party. The participating utilities want some assurance that the reactors, in which they will invest some $350 millions, have a reasonable chance of some day standing on their own feet as competitive power producers. The guaranties and other financial incentives offered for the first 10 years under the program serve only to limit the loss of the operators during the initial period. Without a vigorous research and development program, these units would probably not produce appreciably cheaper power after 10 years than they would initially and, with the termination of the operational assistance program, the utilities would find themselves with expensive power generating facilities.

The actual extent of the research and development program will, of course, be determined by the amount of useful research and development that can be done during the initial design and construction phase of the specific reactor projects that are chosen for the program and on those phases of the reactor system which lend themselves to improvement and modification after the reactors are part of an operating system.

The attached list of types of work that can and must be done gives an idea of the scope of the expected program.

With 2, and possibly 3, basic types of reactors being constructed, and with the variations that will be inherent in the 6 to 8 actual projects under the program, and with the understanding that a major emphasis will be placed on full-scale testing, under actual operating conditions, of fuel elements, components, instruments, etc., the anticipated expenditure of $100 million during the next 5 years is thought to be reasonable. Experience in this country has indicated that $5 million to $10 million of preoperational research and development is not unreasonable for reactors of the size contemplated. As a matter of interest, about $85 million was spent on PWR, not including the reactor facility itself. To achieve the economical promise of the reactors constructed under the United States-Euratom program an extensive postoperational program also is required and would be supported by this research and development fund.

Since our experience with power reactors is somewhat limited, it is not possible to predict, on the basis of experience, how much research and development money can be spent on programs which will be expected to give a reasonable chance of a worthwhile payoff. We have had about 14 years of experience with the effectiveness of research and development on improvement of operation of our production units. On the basis of the dollars spent at Hanford and Savannah River and of the improvement on productivity, it is felt that expenditures of the order proposed are entirely in line with our experience and more importantly that the results which we would expect to obtain from those expenditures will go far toward achievement of economic nuclear power in the reactors under the joint project as well as in all other reactors of similar type.

TYPE OF DEVELOPMENTAL ACTIVITIES ENVISIONED UNDER THE JOINT PROGRAM

I. Fuel cycle studies

(*a*) Methods of converting UF_6 to material used as fuel.
(*b*) Development of new cladding for fuel.
(*c*) Optimization of fuel enrichment and geometry.
(*d*) Techniques for fabricating fuel elements.
(*e*) Procedures for extending operating life of fuel.
(*f*) Minimizing problems of corrosion of fuel elements by coolant.
(*g*) Irradiation tests of fuel elements in test reactors and in full-scale operating reactors.
(*h*) Optimization of heat transfer and nuclear performance of fuel.
(*i*) Improvement of fuel-handling equipment and techniques.

(*j*) Methods of processing and reusing inactivated fuel including evaluation of degree of decontamination needed.

II. Moderator and coolant studies

(*a*) Possibility of changes in moderator and coolant in reactors: For example, heavy water for light water.

(*b*) Methods for clean-up and purification of moderator and coolant.

III. Control and instrumentation studies

(*a*) Development of more effective control materials.

(*b*) Development of better mechanisms for introducing control material.

(*c*) Improvement of techniques of manufacture and fabrication of control unit.

(*d*) Minimizing corrosion of control rods by coolant.

(*e*) Irradiation tests on new control material in test and full-scale reactors.

(*f*) Development of new or improved overall instrumentation to make possible more stable operation under transient and equilibrium operating conditions.

IV. Operational efficiency and safety studies

(*a*) Development of improved operating procedures to decrease costs, minimize maintenance, increase on-stream time and improve overall operational safety.

V. General studies

(*a*) Improvement of auxiliary systems and components so that improvements in reactor operation may be easily translated into decrease in unit costs.

25. Question. What use does the AEC plan to make of the plutonium purchased under the program?

Answer. We cannot at this time make accurate predictions of the ultimate needs for plutonium for nonmilitary uses because its limited availability for such uses has, to date, made it impossible to carry out the extensive research and development which will be required to assure that this material takes its rightful place among the nuclear fuels of the future.

The Commission is only now turning its efforts in a serious way toward the potential of plutonium as a nuclear fuel. It, together with industry, must establish the special facilities needed for the chemical and physical handling of this highly poisonous material. Programs dealing with its chemical and metallurgical properties as well as with the techniques of handling it must be developed. Numerous alloys must be studied in order to determine which is the most suitable for uses in reactors. Large-scale experiments must be undertaken to determine the behavior of plutonium in its various physical and chemical forms under conditions of irradiation. Its stability and efficiency as a nuclear fuel must be determined by using it as fuel in various types of reactors under various conditions.

As the program progresses, as data from one series of experiments become available for analysis, and as more and more reactor physicists, chemists, and metallurgists turn their efforts in this direction, the scope and magnitude of the program will rapidly expand and with it will expand the need for material. Our present preliminary and tentative thinking, developed in the current period when plutonium is looked upon as a scarce material needed for vital military programs, calls for approximately 3,300 kilograms during the next 15 years. We are convinced that as soon as plutonium is available in significant quantities for nonmilitary purposes there will be a sizable demand for all the material made available for the purpose. The long-range nuclear power program must be based on the ultimate use of all available nuclear materials. Plutonium and U–233 must take their place with U–235 as an energy source. Before this can happen there must be extensive research and development programs committing large amounts of these materials.

It should be mentioned that the quantity of plutonium to be purchased by the United States from Euratom to meet these needs may be substantially reduced by the existence of the same types of needs in the member states.

In addition to the obvious needs for developing and using plutonium as a nuclear fuel in power reactors, there is also the potential nonmilitary use of nuclear explosives, which is now in the very early stage of development. Should experiments which will be carried out under the Commission's Project Plowshare be successful, and there is every reason to believe that they will be, the demand for nuclear explosive devices could well become a very important factor in our nuclear planning, and plutonium which is earmarked for nonmilitary purposes could well find extreme utility in this manner.

26. Question. How was the figure of $135 million for the capital loan arrived at?

Answer. The memorandum of understanding provides that the United States loan would be up to $135 million. This figure was developed on the basis, and is meant to reflect, a reasonable estimate of the dollar value of the United States equipment and services purchased for the reactors constructed under this program.

Based on our understanding of proposals submitted by United States industry on reactor projects in Europe, 50 to 60 percent of the equipment and services (excluding civil works) would be imported from the United States. On the basis of the total plant cost, it appears reasonable to expect that 35 to 45 percent of the cost would be for United States equipment and services.

Typical breakdown of construction costs

Item	*Percent of total cost*
Reactor vessel	1.2
Containment	1.8
Fuel-handling equipment	1.3
Building and site	20.8
Instruments and controls	2.8
Reactor core and fittings	1.8
Accessory electrical equipment	3.7
Control rods and drives	.5
Turbogenerator	23.5
Condenser	2.9
Feed-water heaters	.9
Reactor forced circulation pumps	1.2
Reactor feed pumps	.5
Interconnection piping	5.6
Engineering	12.8
Overhead	5.9
Contingency at 15 percent	13.0
Total	100.0
Cost distribution:	
Labor	35
Materials	62
Engineering	13
Total	100

Plutonium requirements

Use [1]	Through June 30, 1957	Fiscal year														Total
		1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	
Domestic power and research and development [2]	40	140	130	390	150	50	100	100	100	100	100	100	100	100	100	100	100	2,000
Commission research and development [3]	40	−20	65	40	10	10	10	10	10	10	10	10	10	10	10	10	10	285
Recycle power reactors	0	0	0	0	0	20	30	50	50	50	50	50	50	60	60	60	60	600
Fast-breeder reactors	0	0	0	0	0	0	0	20	30	50	50	50	50	75	75	75	75	550
Private research and development	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	140
																		3,575

[1] Table does not reflect requirements for plutonium in the following applications:
(a) The use in existing power reactors as enrichment in place of U–235.
(b) New MTR's and ETR's operating with plutonium loading.
(c) Loan of material for foreign power reactors operating on recycle basis or as substitution for U–235.
(d) Loan of material to foreign research and development programs.
(e) Operation Plowshare.
(f) Medical uses.

[2] Includes base program reactors such as EBR–II, PRTR, Lampre, and ZPR's.
[3] Basic research and development not associated with civilian power.

27. Question. Are 1 or 2 companies apt to get all the business at the expense of most of the industry?

Answer. In view of the size of the program and the target date of 1963, it is highly unlikely that 1 or 2 companies in the United States have the ability or capacity to provide all of the equipment, material, or services required. On the contrary, we believe there will be a reasonable distribution of the orders among the companies within the nuclear industry that have a capacity to compete in the program.

APPENDIX A

COMPARISON OF THE SAFEGUARD PROVISIONS OF THE EURATOM AGREEMENT AND THE SAFEGUARD PROVISIONS CONTAINED IN A TYPICAL UNITED STATES COMPREHENSIVE AGREEMENT FOR COOPERATION

EURATOM SAFEGUARD PROVISIONS	BILATERAL SAFEGUARD PROVISIONS
A. The Community undertakes the responsibility for establishing and implementing a safeguard and control system in accordance with agreed-upon principles which are set forth in the agreement for cooperation. This system will be designed to give maximum assurance that any material, equipment, or devices made available pursuant to the agreement and any source or special nuclear material derived therefrom shall be utilized solely for peaceful purposes.	A. The safeguard provisions contain no express provisions relating to the type of safeguard system to be established by the nation. The United States, however, can require the maintenance and production of operating records, and call for reports to assist in assuring accountability of material. The implementation of this provision could well influence the type of accountability system established by the subject government.
B. The Community undertakes the obligation to consult with the International Agency with the objective of establishing a system reasonably comparable with the International Agency system.	B. There is no specific undertaking on the part of a nation to consult with the IAEA in order to design a system reasonably comparable with the IAEA's system.
C. The United States and the Community have agreed on the principles which are to be employed by Euratom in establishing a safeguard and control system and the Community is responsible for establishing and maintaining a mutually satisfactory and effective safeguard and control system in accordance with the agreed-upon principles.	C. Bilateral agreements contain no provisions as to the standard to be adopted by the subject government in establishing a safeguard and control system and there is no express requirement that such system be mutually satisfactory.
D. The Government of the United States will assist Euratom in establishing the safeguard system and will provide continuing assistance in the operation of the system.	D. There is no provision in agreements for cooperation which specifically provide for United States assistance in establishing the subject government's safeguard system. However, the United States does provide assistance under the information provisions of agreements for cooperation.
E. Under the joint program, the parties will jointly approve the technical and economic features of the reactors to be selected. It is expected that designs will be reviewed in this evaluation. Euratom will review and approve the design for purposes of assuring the inspectability of reactors.	E. The United States may, with the objective of assuring design and operation for civil purposes and permitting effective application of its rights, review the design of any reactor and other equipment of the design of any reactor which utilizes materials furnished by the United States.
F. Euratom must establish a safeguards system in accordance with agreed principles. One such principle provides that Euratom will require the maintenance and production of operating records to assure accountability for materials and receive reports with respect to projects. The system developed by Euratom based upon this principle	F. The bilateral agreement with respect to the material covered (comparable to the material to be covered in the Euratom system) permits the Commission to require the maintenance and production of operating records and to request and receive reports for the purpose of assisting and insuring accountability of such materials.

APPENDIX A—Continued

EURATOM SAFEGUARD PROVISIONS	BILATERAL SAFEGUARD PROVISIONS
must be mutually satisfactory. Visits and consultations are provided for to assure the system effectively meets the responsibilities and principles set forth in the agreement and that the materials accountability systems of both parties are kept reasonably comparable.	
G. All material covered by the agreement in the custody of Euratom will be subject to the Euratom safeguard system and the provisions of the agreement for cooperation with Euratom, including the guaranty provisions.	G. Materials covered by the agreement in the custody of the subject government or any person under its jurisdiction is subject to all the safeguards and the guaranties.
H. Under the principles agreed upon, Euratom undertakes the obligation to assure that materials not currently utilized for civil purposes are deposited in storage facilities maintained by the Community.	H. Special nuclear material not current utilized for civil purposes is required to be deposited in storage facilities designated by the United States.
I. Frequent consultations and visits between the parties will take place to give assurance to both parties that the Community's safeguard and control system effectively meet responsibilities and principles stated in the agreement and that the standards of the materials-accountability system of the United States and the Community are kept reasonably comparable. The United States will assist the Community in the establishment of its system and will provide continuing assistance in the operation of the system. The Commission may verify by mutually approved scientific methods the effectiveness of the safeguards and controls system established by Euratom and Euratom may do likewise with respect to materials made available to the Commission.	I. The United States, after consultation with the subject government, may designate personnel accompanied, if either party so requests, by personnel of the subject government who shall have access to all places and data necessary to account for the source and special nuclear material which are subject to the safeguard provisions of the agreement. The personnel assigned by the United States may make such independent measurements as it deems necessary.
J. A continuation of the cooperative program is contingent upon Community's establishing and maintaining a mutually satisfactory and effective safeguard and control system which is in accord with the principles set forth in the agreement.	J. In the event of noncompliance with the safeguard provisions of the agreement or the guaranties set forth in the agreement and the failure of the subject government to carry out the safeguard provisions within a reasonable time, the United States may suspend or terminate the agreement and require the return of any material, equipment, and devices subject to safeguards.
K. Under the exchange-of-information provisions, the parties will consult on matters of health and safety.	K. The United States is to consult with the subject government relating to matters of health and safety.
L. No express provision dealing with bilateral L. (See, however, sec. C of the agreement concerning exchange of visits and consultations and the necessity to establishing a mutually satisfactory system and sec. E of the agreement providing that the cooperative program is contingent upon the Community's establishing and maintaining a mutually satisfactory system.)	L. The subject government undertakes to facilitate the application of the safeguards set forth in the agreement.

APPENDIX A—Continued

EURATOM SAFEGUARD PROVISIONS	BILATERAL SAFEGUARD PROVISIONS
M. The Commission and the Community will consult with each other from time to time to determine whether there are any areas of responsibility with regard to safeguards and controls and matters relating to health and safety in which the Agency might be asked to assist.	M. The parties will consult to determine in what respects if any they desire to modify the provisions of the agreement for cooperation to arrange for the administration by the International Atomic Energy Agency of those conditions, controls, and safeguards, including those related to health and safety standards required by the International Atomic Energy Agency in connection with similar assistance rendered to a cooperating nation under the aegis of the International Atomic Energy Agency. In the event the parties do not reach a mutually satisfactory agreement following such consultation, either party may terminate the agreement and in the event it is terminated the subject government shall return to the Commission all source and special nuclear materials received pursuant to the agreement.

Summary of funding—Joint United States-Euratom cooperative program

	Fiscal year 1959		
	Authorization required	Obligation authority required	Estimated expenditures
Special fuel cycle arrangements for 1,000,000-kilowatt reactor program	$90,000,000	$15,000,000	0
Joint research and development program, United States share	50,000,000	10,000,000	$2,000,000
Total authorization and funding required	140,000,000	25,000,000	2,000,000

EXPLANATORY NOTES

1. (*a*) The cost of the special fuel cycle arrangements cannot be established precisely at this time, however, the best estimate of the probable maximum cost is $90 million over the 10-year operating period involved, with the high probability that the cost will be considerably less.

(*b*) No expenditures will be incurred under the fuel cycle arrangements until fiscal year 1962. Thereafter, the cost would reach a peak during the first 5 years of operation—1963 through 1968—and, by reason of experience and improvements in technology, should gradually taper off to zero in 1973, in the last core loadings to be made under the program.

2. Although the joint research and development program would be established for a 10-year period, authorization funds would be requested at this time only for the first 5 years. Prior to the completion of this 5-year period, Euratom and the United States would determine the financial requirements for the remaining 5-year period and would undertake to procure funds necessary to carry out the program. Funds for the second 5-year period may be in the same order of magnitude.

3. Under the proposal to purchase plutonium in excess of the amounts retained by Euratom for peaceful purposes, the maximum expenditure through the first 10 years of operation is estimated to be $50 million corresponding to 4,100 kilograms of plutonium. The actual expenditure will be dependent on the amounts retained by Euratom or acquired by the International Agency under its first option to acquire plutonium in excess of the amounts retained by Euratom.

4. The Export-Import Bank will extend a long-term line of credit of up to $135 million at 4½ percent interest to cover a portion of the total capital costs. Approximately $215 million is to be provided by participating utilities and other European sources of capital with financing to be arranged with the appropriate assistance of the Community.

5. The Atomic Energy Commission will sell to Euratom a net quantity of 30,000 kilograms of contained U–235 in uranium to cover the fueling and other requirements of the program for such materials over a 20-year operating period. The initial operating inventory, which amounts to approximately 9,000 kilograms of contained U–235, will be sold to the Community on a deferred payment basis at the domestic prices in effect in the United States at the time of transfer. Payment by the Community on the principal may be deferred for a period not to extend beyond December 31, 1973, with interest to be paid on this debt at 4 percent per annum. After the deferral period, Euratom will start paying, in equal annual installments, the debt incurred for fuel plus interest at 4 percent per annum on the unpaid balance. These payments will have to be completed by December 31, 1983. The balance of about 20,000 kilograms to be sold to Euratom, which represents estimated burnup and process losses over the 20-year operating period and 1,000 kilograms to provide for research and test reactors associated with the program would be payed for on a current basis.

6. It is estimated that the net revenue [1] from enriched uranium sold for replacement fuel during the first 10 years of operations of the 1-million-kilowatt Euratom program would be in excess of $90 million. This would be almost twice the $50 million expenditures required to cover repurchase of all plutonium estimated to be recovered from reprocessed spent fuel from these reactors during the 10-year period.

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[1] Net revenue is the difference between the charge for continuing enriched uranium requirements in addition to the initial inventory, and the credits for uranium returned after irradiation, based on the United States published schedule of charges.

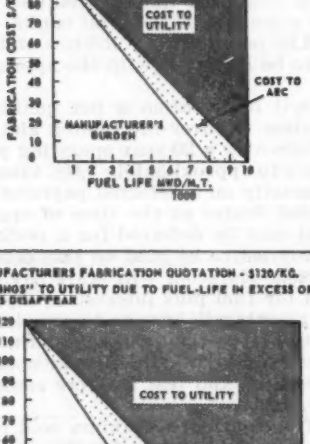
OPERATION OF GUARANTEE

GENERAL ASSUMPTIONS -

1. STAINLESS STEEL CLAD OXIDE ELEMENTS. CHARGE 24,400 KG.
2. MANUFACTURER GUARANTEES FUEL LIFE OF 8000 MWD/ METRIC TON
3. AEC GUARANTEES FUEL LIFE OF 10,000 MWD/M.T. AND FABRICATION COST OF $100/KG.

CASE I

MANUFACTURERS FABRICATION QUOTATION - $100/KG.



FAILURE MWD/M.T.	COST OF REPLACEMENT TO			% OF CHEM PROCESS AND TRANSPORTATION PAID BY UTILITY
	UTILITY	AEC	FABRICATOR	
4,000	$ 40	$30	$30	40
6,000	60	15	25	60
8,000	80	20	0	80
9,000	90	10	0	90
10,000	100	0	0	100

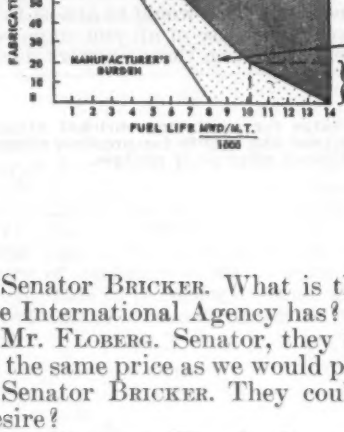
TOTAL COST TO AEC IS CONSTANT UNTIL LIFE EXCEEDS MANUFACTURERS GUARANTEE. BEYOND THIS POINT AEC COSTS DECREASE UNTIL 10,000 MWD/M.T. LEVEL IS REACHED AT WHICH POINT THEY BECOME ZERO.

FAILURE	NO. CHARGES	KG/ CHARGE	TOTAL KG	AEC COST/KG	TOTAL AEC COST
4,000	2 1/2	24,400	$61,000	$10	$610,000
8,000	1 1/4	24,400	30,500	20	610,000
9,000	1 1/9	24,400	27,111	10	271,110

CASE II

MANUFACTURERS FABRICATION QUOTATION - $120/KG.

"SAVINGS" TO UTILITY DUE TO FUEL-LIFE IN EXCESS OF 10,000 MWD/M.T. SHARED 50-50 WITH AEC TO POINT WHERE AEC COSTS DISAPPEAR



$10/1000 MW

FAILURE MWD/M.T.	COST OF REPLACEMENT TO			% OF CHEM PROCESS AND TRANSPORTATION PAID BY UTILITY
	UTILITY	AEC	FABRICATOR	
4,000	$ 40	$20	$60	40
6,000	60	30	30	60
8,000	80	40	0	80
10,000	100	20	0	100
12,000	110	10	0	100
14,000	120	0	0	100

FAILURE	NO. CHARGES	KG/ CHARGE	TOTAL KG	AEC COST/KG	TOTAL AEC COST
4,000	2 1/2	24,400	61,000	$20	$1,220,000
8,000	1 1/4	24,400	30,500	40	1,220,000
10,000	1	24,400	24,400	20	488,000
12,000	5/6	24,400	20,330	10	203,300

Senator BRICKER. What is the option to purchase plutonium that the International Agency has?

Mr. FLOBERG. Senator, they have the option to buy the plutonium at the same price as we would pay, that is, the fuel value price.

Senator BRICKER. They could take any portion or all that they desire?

Mr. FLOBERG. Yes, sir; for peaceful purposes.

Senator BRICKER. I know for peaceful purposes, but if it were furnished to one of their members, what guaranty would we have that it would be used for peaceful purposes?

Mr. FLOBERG. There are several things, Senator. For one thing, the International Agency by definition is a peaceful organization. The second thing is that article 12 of its charter so provides with regard to the use of such material, and the third thing is that we are represented on the Board of Directors.

Senator BRICKER. You are satisfied there is adequate authority to protect the uses?

Mr. FLOBERG. I am satisfied, Senator.

Senator BRICKER. Would you furnish me a copy of the agreements that I am able to read it? That is, this Euratom treaty?

Mr. FLOBERG. We will get you one, Senator; yes, sir.

Senator BRICKER. I just wanted it before the next Tuesday meeting.

Mr. FLOBERG. There is one in the record already.

Senator ANDERSON. Of the treaty?

Mr. FLOBERG. Yes, sir; I submitted it this morning. We will see that you get a couple more copies.

Senator ANDERSON. You submitted it to be filed. We are not going to reprint all of this, are we?

Mr. FLOBERG. That is up to you.

Senator ANDERSON. I want a copy of the treaty as you submitted it here.

Mr. FLOBERG. That came in with the answer to the GAO questions, and so forth, and I assume you want those in the record. If you choose not to put these into the record——

Senator PASTORE. I suggest, Mr. Chairman, that it be included in the record by reference.

Mr. FLOBERG. That is all right by me.

Senator ANDERSON. We would like to have a total of 5 or 6 copies, if possible.

Mr. FLOBERG. I don't know if we have 5 or 6, but we will scrounge up whatever we do have.

Senator ANDERSON. They must have some available somewhere. It would be fine if we could get them.

We will try to have the witnesses ready to conclude these hearings starting next Tuesday. If we find it is impossible to schedule them for Tuesday, we will conclude the hearings on Wednesday and Thursday mornings with these industrial representatives.

If we run into additional questions, we may request the AEC representatives to return at that time.

Now, Mr. Floberg, since I asked 4 or 5 questions, maybe I ought to say at the end of this rather long examination of you that I personnally appreciate and in behalf of the committee want to express my deep appreciation to you for a very fine presentation, and to your fellow Commissioners and staff members for their attendance and their work.

We hope, in spite of all of the questions that have been raised, that we will be able to progress rapidly with this document, and that it will be worked out in time to be of use to the program which you have been describing and on which you have been engaged.

We appreciate very much this testimony by you.

(Following is correspondence submitted by AEC subsequent to the hearings regarding various questions raised during the course of the hearings:)

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington, D. C., August 1, 1958.

Hon. CHET HOLIFIELD,
Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. HOLIFIELD: During the course of the various hearings on the proposed Euratom cooperation program, you have several times evidenced some misgivings

over certain of its aspects. The purpose of this letter is to clarify in writing some of the points you, the Commission staff, and I covered at our meeting in your office on July 30, 1958.

I gathered that an area of general concern to you is whether those phases of the proposed program which establish the target date of 1963 and the principle of "proven types" reactors will tend unduly to favor construction by 1 or 2 major reactor equipment manufacturers, will result in several reactors which are "Chinese copies" of each other, and will take it impossible for us to get full benefit of the developmental possibilities of the program.

It is both our belief and our objective that the program we have developed will not in fact give rise to the situations mentioned above.

In the first place, I am convinced that the mechanism under which any type reactor can be found to be of a "proven type" by a joint United States-Euratom determination is clearly established. I am further convinced that both we and Euratom have every desire to include all reactor types which have shown promise of successful power production at potentially reasonable costs, and that we will, therefore, give serious consideration to any request by American industry that a particular type be included in the program. It is obvious, of course, that the time schedule of the program will exclude reactor types that are still in the early stages of development.

As you know, we have already received one such request—that of Atomics International to include the organic moderated concept. We have evaluated the information contained in this request and have recommended to Euratom that this concept be made eligible for consideration under the program. While we have not yet heard officially the results of their evaluation of the data presented, we understand unofficially that Euratom agrees with us. If this is true, the organic moderated reactor concept will take its place alongside pressurized and boiling reactor types as "proven types" eligible for consideration under the program. Of equal importance is a determination by a utility of whether to consider this concept is whether United States guaranties will be extended to fuel to be used in organic moderated reactors. On this point, we have informed Atomics International that we are now ready to extend the same guaranty to stainless steel oxide elements used in organic moderated reactors that we extend to those elements used in water reactors. We have further informed Atomics International that we stand ready to evaluate, for determination of guaranties, other types of fuel elements which they may desire to use as soon as they present the technical data upon which we can base such an evaluation.

The question of whether the program is of such a nature that only 1 or 2 United States reactor equipment manufacturers can participate was one that was subject of much discussion in the Commission. We, as well as you, do not want this to happen. I think that there are two aspects of the proposed program which tend to minimize this problem. In the first place, as I have just discussed, at least three concepts are eligible for consideration. This in itself should assure a certain spread among manufacturers. We must and do realize, however, that the mere fact that we have determined that a concept is eligible for consideration does not mean necessarily that utilities in Europe will actually buy a reactor of that type. We must be prepared for the possibility, although I think it highly improbable, that the utilities will be interested in only one type of reactor for the entire program. Even in this event, I am quite sure that the number of units to be built and the time scale on which they must be built would preclude a situation under which 1 or 2 companies get all the business. The problems surrounding each reactor project will, I am sure, be so great that any manufacturer will find it a major effort to take on more than one job at a time as would be required under the tight time schedule we have established and nearly impossible to take on more than two. If we were to relax on the 1963 date, it is possible that, by increased staggering of the various aspects of design and construction, a large company could handle more of the units than under our target schedule.

For the reasons given above, I feel that if we hold to our goal of a million kilowatts by 1963, there will be ample opportunity for several capable United States equipment manufacturers to participate in the program. If we extend the time scale or decrease the capacity goal appreciably, this might not be the case.

With regard to your concern over whether, by building all the units essentially on the same time scale, we will be building "Chinese copies" which will not advance the art, I think there are two points to consider. In the first place,

the program is open to at least three basic types of reactors, and, of course, reactors of different types will not duplicate each other. More important, however, is the fact that, as I discussed above, even reactors of the same type will probably be designed and built by more than one manufacturer or group of manufacturers. Under such conditions, each reactor will be different with respect to many design and operating features, even if all are based on the same concept. Fuel geometry and enrichment, control mechanism, safety devices, heat exchangers, operating and maintenance procedures, and other important aspects of the reactors are very unlikely to duplicate each other. Information gained from simultaneous construction and operation of several units of the same basic type by different designers, fabricators, and operators will probably advance our knowledge to as great an extent as sequential construction by the same fabricator.

In this connection, it is important that reactors constructed today are subject to modification in the future to take full advantage of developments and improvements which might come about as a result of research and development programs and operating experience. I feel that obsolescence is not a major problem in the reactor business, and I think my feelings on this subject have been borne out by the experience we have had on our production reactors.

It is of particular importance that the reactors built under the joint program be designed with maximum flexibility to assure that full advantage may be taken of subsequent developments, especially those resulting in lower fuel costs and longer fuel life. This is true first because these units are considered by the operating utilities who will buy them, as a part of their production system. The utilities' interest in these reactors atoms in part from their conviction that the results of the large scale research and development program aimed specifically at these reactors will assure that they are capable of economic operation after the guaranty program has terminated. The only way this is possible is for the units to be designed in such a way as to allow maximum modification consistent with economic considerations. Aside from the interest of the utilities along these lines, we and Euratom, as well as American and European fabricators, want to be sure that these units can take maximum advantage of the changes which are indicated by research and operation of the future. Thus all concerned are directly interested in this matter, and ti is our intention to make flexibility an important factor in the selection of reactors under the program.

Another point where you indicated some concern, and one which we discussed at some length in our meeting, dealth with the need for a "floor" on guaranties which must be made by fabricators if the project is to be accepted under the joint program and enjoy the benefits of the United States guaranties. As you pointed out, if such a "floor" is established in order to limit the potential liability of the Government, the result might be a restriction on the number of companies which could enter the program and proposals that might otherwise be very attractive could not be considered. We recognized these contradictory factors. In section 6 of attachment A to the memorandum of understanding, we stated, "the technical and economic criteria under which proposals will be evaluated for acceptance will include minimum standards for fabrication charge and integrity guaranty for fuel elements."

We felt, however, that a fixed "floor" is not a feasible approach. When one considers the fact that the utilities are interested in developing a long term satisfactory supplier; that we retain the right to bring in alternate sources of supply; that we plan, in our contracts with the fabricator, to obligate him to give the Euratom projects as good guarantees as he offers outside the program; that the several fabricators are very interested in becoming a part of this first big effort; and that the results of all past as well as future experience on the reactors and their fuel elements will be available to all fabricators, it would appear unnecessary to announce a specific "floor." If this expectation is not borne out, we would, of course, take steps to modify our stand on this.

The last point we discussed, and one which is causing you some concern, dealt with the extent to which the United States Government would be liable in the event of malfunction or failure of the reactor under the project. I am in complete agreement with you that the Government should have absolutely no such liability under this program, and I am of the opinion that we do not. I certainly see no objection, however, to inclusion of language in the legislation which makes this completely clear. The problem of the liability of private United States companies is a separate matter. In most cases, these companies will protect themselves by their contract with the utility. If they don't so protect themselves, it indicates that they are willing to stand the risk and I doubt

that this willingness should be eliminated by statute. The fact is that Euratom recognizes that if the problem is not solved, there will be no major power reactor program, and I am satisfied that the pressure of this program will do much toward solution of the problem. There can be no danger until fuel is delivered since we have a strong voice in when that is done, we do not lose an opportunity to force resolution of the problem by merely authorizing initiation of the program or even by actual construction of the reactors. In fact, the further the program progresses, the more money the utilities will have tied up in construction of the reactors and the greater will be the pressure to solve the problem.

I apologize for the length of this letter, but it dealt with subjects which I could not cover more briefly. I appreciate the opportunity you gave us to talk to you on these subjects and I hope that the discussions and this letter helped allay any concern on your part about this program.

Sincerely yours,

JOHN F. FLOBERG, *Commissioner.*

UNITED STATES ATOMIC ENERGY COMMISSION,
July 31, 1958.

Hon. CHET HOLIFIELD,
House of Representatives.

DEAR CHET: In line with our discussion yesterday concerning the scope of article VI–D of the proposed agreement for cooperation with Euratom, I am enclosing a draft which I believe meets your request for language that could be incorporated in the Euratom Cooperation Act providing expressly that the United States Government assumes no third party liability as a result of its having furnished information, material, equipment, or devices for use in the joint program.

As I indicated yesterday, we do not believe that the problem of third-party liability protection for American suppliers should be dealt with in the Euratom Cooperation Act. This is essentially a problem that Euratom rather than the United States must solve. Under the agreement for cooperation, Euratom has expressly taken on the responsibility of solving it and it recognizes that it must do so expeditiously for European as well as American suppliers. Further, it recognizes that the protection must be adequate if the joint program is to proceed on schedule.

Please let me known if I can be of any further assistance to you on this matter.

Sincerely yours,

JOHN F. FLOBERG, *Commissioner.*

SEC. —. The Government of the United States of America shall assume no liability for any death or injury, or damage to property, arising out of or resulting from information, material, equipment or supplies furnished under the joint program: *Provided, however,* That nothing contained in this section shall deprive anyone of any rights provided for under section 170 of the Atomic Energy Act of 1954, as amended, or any other statute of the United States of America.

(The letters referred to on p. 212 follow:)

DEPARTMENT OF STATE,
Washington, July 25, 1958.

Memorandum for Mr. James T. Ramey, Executive Director, Joint Committee on Atomic Energy, Congress of the United States.

There is enclosed a memorandum concerning the financial obligation of six member countries to Euratom in connection with United States loan financing of capital costs of program, especially pointing out the provisions of the Euratom treaty bearing on this matter.

This is submitted in response to a request made by Senator Clinton Anderson at the hearings on Thursday, July 24, 1958.

STANLEY D. METZGER,
Assistant Legal Adviser for Economic Affairs.

FINANCIAL OBLIGATION OF SIX MEMBER COUNTRIES TO EURATOM IN CONNECTION WITH UNITED STATES LOAN FINANCING OF CAPITAL COSTS OF PROGRAM

Working Paper VII (Financing of the Capital Costs) at pp. 47–48 of the Joint Committee Print of the Proposed Euratom Agreements, states as follows respecting the financial obligation to Euratom on the part of the six member states (France, Italy, Belgium, Netherlands, Germany, Luxembourg):

"* * * it was pointed out [by Euratom representatives] that the unconditional commitment of repayment of principal and interest by the Community was buttressed by the unconditional obligation undertaken by the six member countries in the treaty, to provide the funds necessary to balance the budgets of the Community, including its investment budget. Since a loan to the Community from the United States constitutes a budgetary commitment approved by the Council of Ministers, the full faith and credit of the Community is supplemented by treaty obligations of the member countries to furnish the necessary resources in proportions specified in the treaty."

The treaty establishing the European Atomic Energy Community (Euratom), signed at Rome on March 27, 1957, establishes this obligation as follows:

1. Article 171 of the treaty states:

"1. Estimates shall be drawn up for each financial year for all revenues and expenditures of the Community other than those of the Agency and Joint Enterprises and shall appear either in the operational budget or in the research and investment budget.

"Each budget shall be in balance as to revenues and expenditures."

2. Article 172 paragraph 2 of the treaty, states:

"The revenues of the research and investment budget, apart from any other resources, shall comprise the financial contributions of member states fixed according to the following scale:

"Belgium	9.9
Germany	30.0
France	30.0
Italy	23.0
Luxembourg	0.2
Netherlands	0.9"

3. Article 172, paragraph 4, 1st sentence, of the treaty states:

"Loans for the financing of research or investment shall be contracted on terms to be laid down by the Council acting as provided for in Article 177, paragraph 5."

4. Article 177, paragraph 5, of the treaty states:

"For the adoption of the research and investment budget the votes of the members of the Council shall be weighted as follows:

"Belgium	9
Germany	30
France	30
Italy	23
Luxembourg	1
Netherlands	7

"A majority of at least 67 votes shall be required for the adoption of any conclusions."

5. Article 176 of the treaty states:

"1. Appropriations for research and investment, subject to the limits resulting from programmes or decisions on expenditure which, pursuant to this treaty, require the unanimous vote of the Council, shall comprise:

"(a) budgetary commitments covering a tranche which constitutes an individual item and a coherent whole; and

"(b) payment authorizations representing the maximum sum payable each year for covering commitments contracted under paragraph (a).

"2. The calendar of due dates of commitments and authorisations shall be annexed to the corresponding draft budget proposed by the Commission.

"3. Appropriations for research and investment shall be set out under different headings according to type or purpose of the expenditure and subdivided, as far as necessary, in accordance with the regulations adopted pursuant to Article 183."

6. Article 183 of the treaty states:

"The Council, acting by means of a unanimous vote on a proposal of the Commission, shall:

"(a) lay down the financial regulations specifying, in particular, the procedure to be adopted for establishing and implementing the budgets, including that of the Agency, and for rendering and auditing accounts;

"(b) determine the methods and procedure whereby the contributions by Member States shall be made available to the Commission; and

"(c) establish rules concerning the responsibility of pay-commissioners and accountants and arrange for the relevant supervision."

7. Article 177 of the treaty states:

"1. The financial year shall run from 1 January to 31 December inclusive.

"2. Each of the institutions of the Community shall draw up provisional estimates of its administrative expenses. The Commission shall combine these estimates in a preliminary draft operational budget. It shall attach its opinion which may contain divergent estimates. It shall also prepare the preliminary draft of the research and investment budget.

"The preliminary draft budgets shall be laid before the Council by the Commission not later than 30 September of the year preceding that of their implementation.

"The Council shall, whenever it intends to depart from the preliminary drafts, consult the Commission and, where appropriate, the other institutions concerned.

"3. The Council, acting by means of a qualified majority vote, shall establish the draft budgets and shall then transmit them to the Assembly.

"The draft budgets shall be laid before the Assembly not later than 31 October of the year preceding that of their implementation.

"The Assembly shall be entitled to propose to the Council amendments to the draft budgets.

"4. If, within a period of one month after receiving the draft budgets, the Assembly has either stated its approval or has not transmitted an opinion to the Council, the draft budgets shall be considered as finally adopted.

"If, within this period, the Assembly has proposed any amendments, the draft budgets so amended shall be transmitted to the Council. The Council shall then discuss them with the Commission and, where appropriate, with the other institutions concerned and shall finally adopt the budgets by means of a qualified majority vote, subject to the limits resulting from programmes or decisions on expenditure which, pursuant to this Treaty, require the unanimous vote of the Council.

"5. For the adoption of the research and investment budget the votes of the members of the Council shall be weighted as follows:

"Belgium	9
Germany	30
France	30
Italy	23
Luxembourg	1
Netherlands	7

"A majority of at least 67 votes shall be required for the adoption of any conclusions."

8. Article 178 of the treaty states:

"If, at the beginning of the financial year, the operational budget has not yet been voted, expenditures may be effected on a monthly basis per heading or other division of the budget, according to the provisions of the regulations adopted pursuant to Article 183, up to one-twelfth of the budget appropriations for the preceding financial year, provided that the amount so made available to the Commission shall not exceed one-twelfth of the total appropriations shown in the draft budget in course of preparation.

"If, at the beginning of a financial year, the research and investment budget has not yet been voted, expenditures may be effected on a monthly basis per heading or other division of the budget, according to the provisions of the regulations adopted pursuant to Article 183, up to one-twelfth of the appropriations corresponding to the annual estimates entered in the calendar of due dates of payments for budgetary commitments previously approved.

"The Council, acting by means of a qualified majority vote, may, subject to observance of the other provisions laid down in the first and second paragraphs, authorize expenditure in excess of one-twelfth, subject to the limits resulting from programmes or decisions on expenditure which, pursuant to this Treaty, require the unanimous vote of the Council.

"Member States shall pay every month, on a provisional basis and in accordance with the scales adopted for the previous financial year, the amounts necessary to ensure implementation of this article."

9. Article 181 of the treaty states:

"The budgets and statement provided for in Article 171, paragraphs 1 and 2, shall be drawn up in the unit of account fixed in accordance with the provisions of of the financial regulations adopted pursuant to Article 183.

"The financial contributions provided for in Article 172 shall be made available to the Community by Member States in their respective domestic currencies.

"The available balances of these contributions shall be deposited with the Treasuries of Member States or with bodies designated by them. The funds, while on deposit, shall retain their par value in relation to the unit of account mentioned in the first paragraph, such par value being that in force at the date of deposit.

"These balances may be placed under conditions to be settled in agreements concluded between the Commission and the Member State concerned."

Approval of the loan in accordance with the terms of the treaty as part of the investment budget of the Community will, it appears from the terms of the treaty, result in the assumption of a financial obligation on the part of the member states to support Euratom in accordance with article 177, paragraph 2 of the treaty in servicing and repayment thereof.

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington, D. C., July 29, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. DURHAM: In the course of my testimony before the Joint Committee on July 23 and 24, there were a few questions asked of me which I said I would answer after I had the opportunity for a little more deliberation. I shall now proceed to do so.

On pages 249, 271, and 337 was raised the question of the obligation of the United States under the terms of the proposed agreement for cooperation, if, in the judgment of the United States, the Euratom Community failed to provide adequate security for the loans expected to be made under the proposed line of credit or if for some reason the Export-Import Bank itself was unable to finance the loans. The pertinent provision is article I (b) (2) of the agreement for cooperation, which states:

"Up to $135 million should be provided by the Government of the United States of America to the Community in the form of a long-term line of credit *on terms and conditions to be agreed*, such funds to be re-lent by the Community for the construction of facilities under this program." [Emphasis supplied.]

The contribution of the United States to the capital costs of the program is expected to be in the form of a long-term line of credit provided by the Export-Import Bank. One of the conditions which the United States, acting through the Export-Import Bank, will insist upon under the "terms and conditions to be agreed" provision is that adequate security be obtained from the borrower to assure repayment of loans under the line of credit. These assurances will be fundamental to the consummation of any loans. In the unlikely event that the Export-Import Bank and Euratom cannot in good faith agree on the security for any proposed loans or on other terms and conditions, then in my judgment the United States would be under no obligation to make a loan with respect to such a project because the parties could not mutually agree on suitable terms and conditions for that loan. Other agencies of the Government, as for example the Atomic Energy Commission itself, might wish to take a look at the problem and to seek specific authorization to extend the credit, but I find it very difficult to imagine circumstances in which any other governmental agency would be satisfied by terms and conditions that did not satisfy the Export-Import Bank. It seems clear to me that it is the prerogative of the United States to designate the agency which will act for it in negotiating the line of credit and the loans under it, and we have indicated that the Export-Import Bank is that agency. It is up to Euratom and the Export-Import Bank to come to terms. If they do not, my first assumption would be that there is no deal. Salvage might be attempted, but I see no obligation to do so.

If, in the course of the program, it develops that the program is scaled below the 1 million electric kilowatts of reactor projects, or that the Euratom par-

ticipants cannot finance their share of the full 1 million electric kilowatts, we would anticipate that there would be an approximately proportionate decrease in the amount of any United States loans. The result would be a reduction of the overall level of the program, but this reduction would not in any way modify the intention of the United States to obtain adequate security for the loans that would actually be made. I am here repeating the substance of the answer that I made at the top of page 338 of the typewritten transcript.

I may add that since the hearing on July 24, I have talked with Mr. Max Kohnstamm who has indicated to me his complete understanding of the fact that the terms and conditions of any proposed loan must be agreed upon by both the United States and Euratom. He has indicated to me that although he regards this point as quite clear, he is perfectly willing to undertake to have Euratom so indicate to us in writing and has expressed to me his confidence that Euratom will so do if we request.

On page 344 of the typewritten transcript of the Euratom hearings of July 24 before the Joint Committee, I indicated that any corrections to my testimony other than purely typographical and grammatical ones would be covered by a letter to the Joint Committee. I intend this letter to serve that purpose.

On page 180 of the typewritten transcript for the July 23 session of the hearing, in the 15th line, my answer should be corrected as follows:

"You have paraphrased it correctly, yes, sir, except that your phrase 'without any mortgage back' is too broad. We intend to have a lien that is the equivalent of a purchase money mortgage."

On page 183 of the typewritten transcript, my last answer on the page should be corrected to read as follows:

"No, if I were on the other side I think that would be a terrific restriction. That would be like buying an automobile with a full tank of gasoline under circumstances such that the possibility of buying further gasoline was uncertain."

On page 185 of the typewritten transcript, in the fifth line, my answer should be corrected to read as follows:

"That is correct, or at least their lawyers find difficulty in interpreting it otherwise. Their legal analysis has not impressed me very favorably, but it is true that the legal question does involve some uncertainty. The political problems are really more important than the legal ones insofar as this issue is concerned."

On the same page, my last answer should be corrected to read as follows:

"Title is like barometric pressure; where it is is not nearly so important as what is happening to it. The technical location of title is important principally because it locates rights and risks, but this result can be achieved by contract terms practically as well, if not just as well, as by title location."

On page 195 of the typewritten transcript of the hearing of July 24, after the last word on the page, add the following sentence:

"Although Euratom's legal analysis impresses me as being considerably less than conclusive on the matter of excluding the possibility of leasing, I do not think its lack of clarity is of supervening importance, because I do not regard the legal point, although it deserves not to be ignored, as the really controlling one in this particular case."

On page 238, in the seventh line, add the following sentences:

"There is a distinction between the terms, conditions, duration, etc., *of the cooperation* and the terms, conditions, duration, etc., *of the financing* of that cooperation. One of the terms of the proposed program is that financing will be arranged; the statute does not require the terms, conditions, duration, etc., of the financing of that proposed program to be submitted at this time."

On page 333, in the tenth line, my answer should be corrected to read as follows:

"It is too late for us to get the merit badge but not too late for you to get it. I might add that I am the Commissioner probably more responsible than any other for insisting on the clarification of the safeguards and controls issue, and I am willing to accept personally the burden of the delay attributable thereto. It is my opinion, however, that the exchange of letters has considerable significance, and I consider the time spent in developing them to have been well invested. It is perfectly obvious, however, that the expenditure of time has created a critical problem of scheduling."

Respectfully yours,

JOHN F. FLOBERG, *Commissioner.*

(Note.—A correlation of page numbers in the typewritten transcript and those in the printed hearings will be found in pt. 2.)

(Whereupon, at 4:45 p. m., Thursday, July 24, 1958, the hearing was recessed, to reconvene Tuesday, July 29, 1958, at 10 a. m.)

PROPOSED EURATOM AGREEMENTS

TUESDAY, JULY 29, 1958

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met, pursuant to recess, at 10 a. m., in room 457, Senate Office Building, Hon. Carl T. Durham (chairman of the committee) presiding.

Present: Representative Durham, Senators Pastore and Bricker.

Also present: James T. Ramey, executive director; David R. Toll, staff counsel; George E. Brown, Jr., George F. Murphy, professional staff members; and Capt. Nels R. Nelson, United States Navy, consultant, Joint Committee on Atomic Energy.

Chairman DURHAM. The committee will come to order.

This is the fourth day of public hearings by the Joint Committee on Atomic Energy on the proposed Euratom agreements.

This morning the committee will hear the views of industrial and other public witnesses. The committee will have a final public session tomorrow morning to complete public testimony.

Several weeks ago the Joint Committee solicited the written comments of some 50 reactor experts and other industrial representatives on the proposed Euratom agreements. We have received a number of replies to this solicitation of views and they will be printed as an appendix to these hearings.

In addition to these written responses, the committee hopes in the next 2 days to develop useful information from discussions with industrial and other public witnesses appearing in person before the committee.

Also, without objection, I will include in the record the statement by Senator Bridges, printed in the Congressional Record at page 13071.

(The material referred to follows:)

[From the Congressional Record, July 21, 1958]

INTERNATIONAL AGREEMENT BETWEEN THE UNITED STATES AND THE EUROPEAN ATOMIC ENERGY COMMUNITY

Mr. BRIDGES. Mr. President, it is all but impossible these days to avoid discussion of the crisis now confronting the free world. We can only pray that the calculated risk which President Eisenhower found necessary to take will not lead to all-out war.

But there are some rays of sunshine visible through the clouds, Mr. President. I refer, in particular, to the recent message of the President, asking the Congress to approve an international agreement between the United States and the European Atomic Energy Community.

This agreement would open the way to using nuclear power in Western Europe to help our friends meet their rising demands for peaceful energy. It ties in closely with a major aim of our foreign policy—to provide new horizons for continuing economic and social advances in an integrated Europe.

The joint program is designed to bring into operation by 1963 about 1 million electric kilowatts of installed nuclear capacity in the European Atomic Energy Community. This capacity would be produced from reactors of proven types developed in the United States.

It is unfortunate that this program has come to us late in the session of Congress. But I understand, Mr. President, that the Joint Atomic Energy Committee plans to begin hearings shortly on this subject.

I believe that many people in this country as well as the peoples of free Europe hope that the Congress will not adjourn without acting favorably upon this vital legislation.

Chairman DURHAM. Our first witness this morning is General Jess Larson, president of the Uranium Institute of America.

General Larson, will you please proceed?

We are glad to have you with us this morning, Mr. Larson. You may proceed in your own way.

STATEMENT OF JESS LARSON, PRESIDENT, URANIUM INSTITUTE OF AMERICA; ACCOMPANIED BY GORDON WELLER, EXECUTIVE VICE PRESIDENT

Mr. LARSON. Thank you very much, Mr. Chairman.

Gentlemen of the committee, on behalf of the membership of the Uranium Institute of America, of which I have the honor to head as president, I wish to express our gratitude for the opportunity of appearing before you in the course of these hearings covering the proposed Euratom agreements.

I am personally associated with the ownership and management of an active uranium mine in the Moab, Utah, area. I am not a technician.

However, Mr. Gordon Weller, of Grand Junction, Colo., executive vice president of our institute, is an engineer with considerabl experience, and is here beside me today to assist in the discussion of this subject.

Mr. Weller has heretofore appeared before you on matters of mutual interest concerning the industry.

From these appearances I will assume that you have a knowledge of our organization and what it represents.

Briefly, by way of reminding you, I will only say that our membership cover a fair cross section of the domestic producers and processors of uranium ore and the attendant services connected therewith.

It is to express some views and some concerns of that segment of our domestic uranium industry that we appear before you today.

Let us make it clear in the beginning that, as we understand it, we believe the approach to the development of a practical atoms for peace program is embodied in the Euratom concept.

Within the limits of our understanding, we recommend the favorable consideration of these agreements.

Since this first phase of the Euratom program provides for capacity to generate 1 million kilowatts of electric power, and an eventual expansion to 15 million kilowatts, you can understand our concern with the fuel requirements of such a vast program.

The entire Euratom program might well require on the order of $2 billion in fuel costs over a 20-year period.

On page 37 of the Joint Committee print Proposed Euratom Agreements, under the working papers, Chapter 4: Guaranties and Incentives, it is pointed out that:

The reactors now considered will use slightly enriched uranium fuel. The United States Atomic Energy Commission would guarantee full supply of this special material for 20 years operating * * *

I might interpose there that that, of course, goes only to the first phase of the program, or the 1 million kilowatts.

So long as this phase of the Euratom program is tied to reactors using enriched fuels, the United States Atomic Energy Commission is necessarily a middleman in the production of those fuels.

To the extent that this program will require additional fuel for its operation, it is assumed that the domestic uranium industry will participate in a fair share of the supplying of the raw materials that go into the program.

However, we wish to point to a problem inherent in this type of arrangement. That problem is the complete reliance on the Federal Government as our only customer for the sale of the raw material that goes to make up these enriched fuels.

Such a situation presents a grave obstacle in the way of the attainment of the domestic uranium industry's goal to free itself from dependence upon the United States Government as its sole customer.

You can readily understand the apprehension of this young and dynamic industry, growing as it has under the impetus of the constructive programs of a benevolent government, wanting to take its place among the other free enterprises and competitive suppliers of fuels being marketed in the world today.

We understand and appreciate the fact that insofar as these agreements are concerned, the representatives of the Euratom countries have specified the general type of reactor to be built for their use.

We certainly do not wish to inject any criticism that would delay or even forestall the approval of the program.

We do feel, however, and very strongly so, that in the phases of this program which are to follow, as well as in the expenditure of public moneys for research under other programs, due consideration must be given to the availability of markets thus created which might be supplied by our own domestic uranium industry.

We certainly appreciate the efforts of this committee to stimulate a positive, constructive approach to the development of economic atomic powered generating capacity and by our appearance here today we wish to compliment such efforts rather than merely lodge a complaint.

Therefore, on behalf of our membership and the domestic uranium industry, we would urge this committee to in turn urge upon the executive branch that, in order to assist in generating a free and competitive market for domestically produced uranium as a fuel, research, study and evaluation be given to the following possible undertakings:

1. That a study be made in connection with the use of enriched-type fuels to determine whether or not it would be practical and helpful toward the attainment of our goals to permit the sale of enriched type fuel directly to the user by a duly qualified and licensed American producer and/or processor of domestic raw materials.

Such an arrangement to be based upon setting up procedures whereby raw materials could be custom processed or "tolled" through Government-owned enrichment facilities.

2. Another study which we would urge to be considered is one which would evaluate the possibilities of adapting the planned reactors to the use of a fuel enriched by a "blending process."

The domestic producer would supply and market the natural uranium and the Government, from its facilities, supply the enriching elements.

3. Finally, we would respectfully urge that a study be made of the possibility of fueling the reactors required under the Euratom program with a combination of natural uranium and plutonium with the domestic producer having an opportunity to supply and market the natural uranium; the plutonium would initially come from Government facilities.

In addition to these specific suggestions we, of course, are vitally interested in the further development of those types of reactors which could operate economically by the use of natural uranium as a fuel, thus bypassing the dependence upon our tremendously expensive Government-owned gaseous diffusion plants.

As an industry we are not unaware of the highly competitive situation which might be created in an open non-Government uranium fuel market.

At the same time we wish to again emphasize that we are not ungrateful to the Congress, this committee, the Atomic Energy Commission, and last, but not least, the American taxpayer for the contributions they have all made toward providing a rapid growth of this great and essential domestic industry.

The development of the uranium mining and milling industry under appropriate Government policy and ingenious private enterprise know-how is unparalleled in history.

On the other hand, we would cast ourselves in the role of willing slaves to the inevitable domination of bureaucracy if we were not endeavoring with every resource at our command to free ourselves, at the earliest practical moment, from all of the pitfalls of exclusive Government domination of our markets.

In its press release No. A–107, dated May 8, 1958, concerning the announcement to "permit private sales of uranium to foreign and domestic users," the Atomic Energy Commission stated, and I quote from the second paragraph thereof:

> **As a result of this action by the Commission, United States industry will be able to compete with other countries for the growing foreign and domestic market for nuclear fuels.**

Such statements as these, emanating from high places in the Government, inevitably lead to a surge of enthusiasm on the part of many producers of uranium in this country that cannot be supported by the circumstances which actually exist.

The facts are that under any program now in operation by the Atomic Energy Commission of which we have knowledge, the Government has preempted the fuel market except for the very small quantities of natural uranium needed by the foreign and domestic market for research purposes.

It is not by this means that progress can be made, but, rather, by an appreciation and a desire on the part of our policy and program planners within the executive branch of the Government to feel a deep obligation to assist their own domestic industry to become self-sufficient.

Thank you for your attention.

Mr. Weller will assist me in answering any questions which you deem appropriate, and which are within our knowledge.

Chairman DURHAM. Thank you very much, Mr. Larson. I think you have brought up a point which, of course, has worried this committee since the end of World War II.

We realize the situation we are in, with a completely dominated, socialized, let me say, industry. It was a very difficult problem, and I think you are aware of that, to get us out of a situation that was created by the fact that it was absolutely necessary to proceed in this manner during the war.

Now, extricating ourselves from the situation in which we find ourselves, as outlined in your statement here, is another very difficult problem that we face.

The committee and the Congress are as anxious as you are and the industries, to try to extricate this industry and put it into private enterprise in America the same as everything else.

We still face the problems that exist today because of the world situation.

I certainly appreciate your statement here this morning.

Are there any questions, Senator Pastore?

Senator PASTORE. I have no questions, Mr. Chairman.

Chairman DURHAM. Senator Bricker?

Senator BRICKER. No.

Chairman DURHAM. Mr. Ramey, do you have any questions?

Mr. RAMEY. I have one comment.

The committee, as you know, has encouraged the study of natural uranium reactors along with enriched fuel type reactors. They have also encouraged the plutonium recycle concept that would permit the reactor to start out with slightly enriched uranium and then switch over to using plutonium as the enrichment and thereby use natural uranium from then on, both of which concepts are being pursued in the commission's domestic atomic energy program.

The committee has received a few comments from industrial equipment concerns, pointing out that in the proposed Euratom program part of it might very well take account of the development of natural uranium reactors in addition to the more advanced enriched type.

Chairman DURHAM. Mr. Weller, do you have any statement which you would like to make?

Mr. WELLER. In connection with Mr. Ramey's statement, it is our position that from our viewpoint we would certainly favor the development of natural uranium reactors.

We do not wish to inject any proposal at this point that would tend to delay the development as it is now contemplated for this first phase of the Euratom program.

The opportunity, however, to market natural uranium directly to customers wherever they may exist in the world and which are qualified and licensed to receive uranium, is one of great appeal to the domestic industry.

Chairman DURHAM. I think it is basic, of course, that we have a sound mining-development program in this country.

What has worried me considerably over a period of years is the fact that we are entirely dependent on offshore material to carry on our weapons program.

Of course, one always feels a little more comfortable when he has his own supply of material.

The committee is familiar with my attitude on the Stockpiling Act, which, of course, we are responsible for, which is related somewhat to this mining situation.

I think the committee is sympathetic and trying in every way possible to keep a sound program going.

Are there any further questions? If not, thank you very much.

Mr. LARSON. Thank you, Mr. Chairman.

Chairman DURHAM. Mr. Philip N. Powers, president of the Internuclear Co., is our next witness.

We are glad to have you with us this morning, Mr. Powers. You may proceed with your statement.

Mr. POWERS. Thank you, Mr. Chairman.

Chairman DURHAM. I think you have had quite a bit of experience in the foreign field. We are glad to have you here with us this morning.

Mr. POWERS. Thank you very much and thank you for the opportunity to appear before you to present the Joint Committee with my views on the proposed agreements.

STATEMENT OF PHILIP N. POWERS, PRESIDENT, INTERNUCLEAR CO.

Mr. POWERS. Since writing to you on this subject, Mr. Chairman, on July 14, I have been able to review the associated documents and materials in much greater detail, and my statement today is intended to supersede that letter.

May I say at the outset that I believe this proposed agreement with Euratom represents very substantial progress toward the development of American policies overseas in the nuclear-power field. It will help to remove a great deal of the uncertainty in the minds of those in the Euratom countries who must assume the responsibility for the purchase and operation of nuclear-power equipment, but who find it difficult to carry all of the risks which are associated with the present state of the technology.

Furthermore, the agreement proposes to rapidly advance the technology of fuel elements and of related matters along lines which will be of concern to those operators of nuclear powerplants in Europe as well as to the American nuclear industry.

Other ways of providing assistance to the Euratom countries could, of course, be devised, but I am impressed with the excellence of the plans which have been developed.

As to the types of reactors which are contemplated in the agreement I understand that in the planning emphasis has been placed upon the boiling-water and pressurized-water reactors as "proven types."

As I read the associated papers, however, it seems to me that adequate provision has been made in the actual carrying out of the program for the inclusion of other types if the state of the technology appears to warrant it at the time that specific projects are proposed.

It is quite possible that serious consideration may have to be given to a reactor of the organic moderated type, and if an American supplier should offer to sell equipment for a gas-cooled-reactor type, it might well turn out that the technology involved would be sufficiently advanced for serious consideration.

The date of 1963 seems very optimistic as the limiting date for completion of construction of 6 to 8 large nuclear-power reactors.

As you know, Internuclear Co. is assisting an Italian company, Senn, in its plans for such a reactor and it is now almost a year since we began the preparation of tenders, and we have not yet completed our evaluation of the bids which were received in April.

After selection of the type of reactor to be built, contracts will have to be negotiated, and it is clear that construction cannot begin for some months. To have the plant in operation 4 years later would appear to be par for the course, and the total time, therefore, is likely to be somewhat more than 5 years after beginning work on the tenders.

In fact, the formal decision to proceed had come during the early part of 1957, when Internuclear was retained to assist in preliminary matters, such as helping to train the Italian staff which was being put together.

Therefore, from the time of decision by the directors of Senn, it seems likely that 6 years will pass before the plant is in full operation, and this was in spite of the fact that Senn management has emphasized speed at all times.

It may be argued, of course, that subsequent projects may move more rapidly, but it will still take time for the management of a European utility company to decide exactly what it wants to do within the new Euratom framework.

Then it will take time to accumulate and to adequately train the engineering staffs which will be required and, after preparation of tenders and evaluation of bids, it will still take time for the approval or disapproval of the proposed projects by Euratom and by the United States Commission.

Still another reason for a possible delay lies in the interest of European companies getting as much as possible of their equipment within their own countries.

Earlier this month I talked with one of the officers of a utility company in Germany where consideration was being given to a large nuclear powerplant of the sort envisaged by Euratom. He told me that he had found that on fairly short notice he could get bids, or at least preliminary proposals, from suppliers on both sides of the Atlantic, but that he had been unable to get any information as to the extent of participation of German manufacturers in the supply of these reactors and he, therefore, had no information as to the cost savings which might result.

As to the probable cost of nuclear powerplants, I am not at liberty to reveal the bids which have been made on the reactor for Senn, but I may certainly point out that our experience on that project indicates that 350 kilowatts appears to be a realistic number.

The proposed systems for guaranteeing fuel-element performance, together with the information about chemical processing services, seem excellent to me because, as I have already indicated, they help the prospective owner and operator to know what his costs are going to be.

As to the proposed methods of information exchange, the provisions of the agreement seem adequate for making available to all interested parties the technical information developed under the program.

The provision of technical information to the engineers in Europe who will be engaged on these power-reactor projects is, however, one of the very important aspects of the proposed arrangement.

Euratom itself, as you know, has elaborate plans for the training of these people, but there is and will continue to be a great deal of technical information which will need to be transmitted by some means from this country.

It is clear that the United States Commission will quite properly make such information available in the form of technical reports, but this is obviously not enough. Only to be able to read a report falls far short of being able to have personal contact and to discuss the problems with individuals who are experts in the matter at hand.

In this connection the proposed agreement provides properly for giving technical advice, for the exchange of personnel, for setting up combined teams, and for other methods of transmitting information as may be mutually agreed.

However, as I understand it, the presumption is that individuals may be made available for these purposes by the Commission at taxpayers' expense, and I should like to remind you that there are many private organizations in this country whose business it is to provide such technical assistance and who in many cases have personnel on their staffs who are outstandingly well prepared to provide this service on a commercial basis.

I am referring, of course, to engineering, consulting, and architect and engineering firms.

I believe, therefore, that in this field the same policy should apply as in the commercial sale of reactor materials; namely, that the Commission would provide the necessary service only if no commercial services are available.

This may also be important from the standpoint of the recipient of the information in Europe because of the provisions of article VI, section D, of the proposed agreement, in which it is specified that the Commission may not accept responsibility for the accuracy, completeness, or suitability of such information.

As you know, the engineering and consulting firms who are in the business of providing such information must be in a position to accept responsibility for their services, and it seems likely that this would be of considerable importance to the eventual owners of reactor equipment.

Thank you again, Mr. Chairman, for the opportunity to appear before your committee today.

Chairman DURHAM. Thank you very much, Mr. Powers. That is a very realistic statement.

I think we have seen some of these things over the period of negotiations and some of the facts that you bring out here certainly are things that we are concerned about.

You have pointed out some of the difficulties. What, in your mind today, is the greatest difficulty facing your own project, the Senn project?

I fully agree with you that if the reactors are available on a commercial basis from private enterprise, then it ought to be done that way instead of at the taxpayers' expense.

What would you say is the one most important thing that seems to be delaying this program instead of carrying out their purpose to have this in being by 1963?

You seem to think it will be 6 years or longer from this period before even under the best conditions prevailing you could actually put these plants into operation.

Mr. POWERS. Mr. Chairman, I do not think of any particular point to single out that is holding up the development.

I think it is a complex of all these factors that we have been talking about. I think also, with reference to the 6-year figure that I mentioned, that this might not be applied to projects which are already well underway.

Chairman DURHAM. I was thinking as to whether or not it was financial troubles, or whether or not it was technical know-how.

We realize, of course, that they have their difficulties.

Mr. POWERS. It certainly is a combination of those factors. I think basically that there are some people who have to agree before the project can proceed, at the same time with a lack of technical information, as you point out, that the whole process is inevitably slow.

I do not see any way in which it could be particularly speeded up beyond what you are proposing in this agreement.

Senator PASTORE. That is a very significant thing you said, "beyond what you are proposing in this agreement."

Let us look at the agreement. I think, according to the agreement, the goal is 1 million kilowatts by 1963. In your opinion, do you think they can achieve that?

Mr. POWERS. In my opinion I am doubtful that they can achieve the 1 million kilowatts by 1963. I think it is possible that on the reactor projects in Europe, which are already decided upon, where there is a utility company in Italy or in Germany perhaps, whose board of directors, or the management, has made a definite decision to proceed, these reactors might possibly be operating by 1963.

But where they have to start from scratch, review the whole field, train a staff of technical people, I think it may be very difficult indeed. This would be the case in several of the 6 to 8 reactors which are visualized.

Chairman DURHAM. Along that line, do you think the passing of this act would speed it up any?

Mr. POWERS. Yes.

Chairman DURHAM. Or would we be in the same position?

Mr. POWERS. There is no question but what the assistance which is provided for in this act will give the whole program a tremendous boost in my mind, because, as I have pointed out, it helps to relieve some of the uncertainties in the minds of those who have to make the final decisions, the managers of the utility companies in these countries.

Now, they will have a better idea of what their costs are going to be.

Senator PASTORE. Along that line, Mr. Powers, are you familiar with the agreements for cooperation that have accompanied the suggestion under 104 of the act?

Mr. POWERS. Not in detail.

Senator PASTORE. The reason for my putting that predicate before you is to ask you this question: Whether you think that the agreement itself, the agreement for cooperation, is complete enough for the

members of the Joint Committee to take action, let us say, within 2 weeks, or whether or not in your opinion more needs to be done under the agreement for cooperation before a definite action can take place?

Mr. POWERS. It is my feeling that this agreement for cooperation, whereas that may not be the best document which could be devised, is such an excellent document that it certainly ought to be approved because there is so much at stake in getting on with the program.

Senator PASTORE. You think from the technical point of view that it is sufficiently complete?

Mr. POWERS. Yes, I do.

Senator PASTORE. I am very happy to hear you say that.

Chairman DURHAM. Mr. Ramey?

Mr. RAMEY. I would like to explore this 1963 date a little bit. What would be the effect of not reaching the goal?

It appears that there are possibly two things: The first is that the guaranties on fuel elements extend for a period of 10 years from 1963.

So an outfit that does not meet the 1963 date will get less than a 10-year period of guaranty on fuel-element cost; is that not correct?

Mr. POWERS. Yes.

Mr. RAMEY. So they might be penalized a little bit if they start operations in 1964 or 1965?

Mr. POWERS. I must explain I was addressing myself to the question that was raised in the letter as to whether or not this seems to be a realistic date. If you ask the further question as to whether or not the date ought to be changed because it is not as realistic as it might be, I am not sure that I would recommend changing it.

I realize that it may not be too serious a complication for a plant to get underway in 1965 under this arrangement. A couple of years are lost in the 20-year arrangements perhaps.

I can also see advantages from the standpoint of the operation of the program itself in giving as quick a date as possible in order to help give more impetus to the program in Europe.

Mr. RAMEY. The other possibility, that might work the other way in setting up an unrealistic target date, is that if a majority of the reactors do not reach it, then some of our competitors might say, "Well, see, the program is lagging again"; and perhaps if you set up a more realistic date and then could meet it, you could not be accused of failing to perform.

Mr. POWERS. Well, I can see these difficulties and I think this is a rather subtle point which will be difficult to answer. I would be inclined to rely myself pretty much on the Euratom people themselves.

I would certainly respect their opinion on whether or not it is important to put down a date which may be a little optimistic.

Chairman DURHAM. Dealing with this group as you have, do you feel, Mr. Powers, that they are very enthusiastic and are intent on carrying through the development of this program?

Mr. POWERS. Yes; I have no doubt that there is a great deal of enthusiasm for this program in Europe.

There is a feeling that atomic energy is a must from an economic standpoint. This is true in some countries, I think, more than others, particularly in Italy.

It is not quite so much true in Germany, perhaps because of the more easily available and cheaper coal which they have there.

But at the same time there is a feeling of urgency everywhere I have been in Europe toward the development of a nuclear power industry.

Senator PASTORE. Because of your intimacy in this field, tell us what your impression is, or your opinion, as to the advantages that will inure to the United States because of the program?

Mr. POWERS. I think the main advantage of this Euratom program from our standpoint, Mr. Chairman, or, at least, from the standpoint of our atomic energy program, is that it will provide a sort of proving ground for our own problems so that through the development of reactors in Europe we are likely to get a bigger boost to our own program at home.

There is a second point which relates to the President's atoms for peace program and ideas of that kind so far as our leadership in the world is concerned on peaceful application, which is one of the very important benefits which we may expect to get from the operation of this program.

Chairman DURHAM. Along that line, I think also from an economic standpoint since our contributions have been over the years quite large in trying to sustain their economies, would you make a further comment on that as to what it means to their economies?

Mr. POWERS. I certainly have the impression that over the next 10 or 15 years the lack of atomic power would constitute a brake upon the development of the industrial economy in Europe.

I think there is no question but what the expansion of that economy is in the interest of the United States.

Chairman DURHAM. It has been one of our main objectives, of course, in our whole foreign-relations program to build up the economy of this block of nations.

It seems to me along those lines it means so much to the future.

Mr. POWERS. I think there is no question but what this will be one of the most important things we can do in helping the industrial development of these countries.

Chairman DURHAM. Thank you very much, Mr. Powers. We appreciate your statement very much.

Mr. POWERS. You are welcome, and thank you very much, Mr. Chairman.

Chairman DURHAM. The next witness is Mr. Wallace J. Campbell, for the Cooperative League of America.

You may proceed, Mr. Campbell.

STATEMENT OF WALLACE J. CAMPBELL, DIRECTOR, WASHINGTON OFFICE, COOPERATIVE LEAGUE OF THE UNITED STATES OF AMERICA

Mr. CAMPBELL. Mr. Chairman, it is a pleasure to be with you.

The Cooperative League has had a continuing interest in the development of a program for the peaceful uses of atomic energy ever since the first public discussion of the dramatic—almost revolutionary—possibilities growing out of the development of nuclear fission.

The Cooperative League is a federation whose membership comes from all sections of the United States. It includes great farm-supply cooperative organizations, city co-ops handling foodstuffs and gasoline, cooperative housing and health associations, rural electric co-ops,

insurance, credit, and other types of consumer, service, and purchasing cooperatives.

At the beginning of the atomic energy program, Jerry Voorhis, who is the executive director of the Cooperative League of the United States of America, and who was then a Member of the House of Representatives, was an active participant in the basic legislative work which led to the enactment of the McMahon Act governing the development of nuclear fission, including the long-range peaceful uses of atomic energy.

Shortly thereafter, the Cooperative League was a direct and active participant in a drive to create a United Nations Authority for Petroleum Development in the Middle East.

Leaders of the American and world cooperatives saw more than a decade ago the necessity for bringing order and stability to petroleum development in the Middle East to prevent the kind of a crisis situation which is now upon us growing out of developments in Lebanon, Jordan, and Iraq.

The International Cooperative Alliance, of which the Cooperative League of the United States of America is a member, presented a proposal to the Economic and Social Council of the United Nations, which would have created a United Nations Authority which could not only solve problems growing out of petroleum development in that oil-rich area, but also would have provided machinery for channeling the rich returns from petroleum production into more direct benefits to the people in the area now inflamed with Arab nationalism.

This development is closely related to the subject before this committee today, namely, the approval of agreements between the United States and the European Atomic Energy Community, better known as Euratom.

Until Euratom can develop a substantial source of power for Europe from atomic energy, Western Europe will continue to remain dependent, almost for its life, on energy developed from the oil brought from the Middle East.

The Cooperative League also was an active participant with the National Rural Electric Cooperative Association and a large group of public spirited organizations in helping to form policy leading to adoption of the Atomic Energy Act of 1954.

Without the active participation of these public spirited organizations, that act would have been loaded with provisions which would have hampered the development of atomic energy and enriched enormously the already large and powerful utilities and electric manufacturers who might have been able to create a monopoly on the development of atomic energy for domestic use here in the United States.

The Cooperative League was also one of the public organizations which urged active United States participation in the International Atomic Energy Agency when it was created a little over a year ago.

The final indication of our vital concern was dramatized Sunday, July 6, of this year, when the Rural Cooperative Power Association and the Atomic Energy Commission signed the long awaited contract authorizing the start on construction of a nuclear plant to produce steam which the electric co-op would convert to electricity for its member patrons.

More than 40,000 families which own the rural electric cooperative in Elk River, Minn., are directly affected by that decision. They are only part of the nearly 4 million American families who are served by rural electric cooperatives which some day soon may find atomic energy is a basic part of their growing energy supply.

We do not pretend to be specialists in the field of atomic energy. There are comparatively few who can so qualify.

We wish, however, to state in general principles our very great concern for speedy development in this field.

Economic integration in Europe: First, we look on Euratom as an important and basic part of the growing integration of Europe. We firmly believe that only with the ultimate development of something akin to a United States of Europe will the political and economic problems of that area be resolved.

The dramatic progress which has been made by the Coal and Steel Community and the proposed development of a Common Market for the same six countries in Western Europe, provide basic ingredients of the pattern of which Euratom is part.

The operation of economic resources of Belgium, France, the German Federal Republic, Italy, Luxembourg, and the Netherlands should lead to greater efficiency, greater economic wealth for the area, and the kind of day-to-day economic cooperation which should remove many of the political problems which grow out of economic strife.

We firmly believe that United States assistance to Euratom at this time, with an agreement of the nature of the memorandum of understanding, can help move forward this drive toward economic integration.

It is our firm belief that it is important for the United States Congress to approve this joint agreement now in order that we may provide tangible evidence of American leadership in this field prior to the forthcoming Conference on Peaceful Uses of Atomic Energy in September, and the first annual meeting of the International Atomic Energy Agency shortly thereafter.

Here is a place for the sense of urgency which is characteristic of this period.

As the Washington Post said Sunday, July 20:

> If Congress fails to act, it will be at least a year before Euratom is more than a dream; by that time the restive French may decide on unilateral shortcuts.

Peaceful uses of atomic energy: Second, the Cooperative League is firm in its conviction that international cooperation of the kind created in Euratom is essential to our own welfare. The atom is such a significant new factor in the world that only if it is used constructively can we prevent its ultimate use as a source of world destruction.

As the Washington Post said editorially Sunday, July 20:

> If Congress approves the legislation which will set the Euratom reactors in motion, it will be the first meaningful fruit of the atoms for peace program. The goal of the 6 European nations in Euratom is the production of 1 million kilowatts of nuclear-power capacity by 1961—a power potential which would substantially lessen Europe's dependence on Middle East oil. The costs will be modest for the United States, amounting to an estimated $135 million in loans and a $50 million contribution to the joint research program. European capital will supply $215 million for construction costs.

Experimental development of atomic power: Third, the Cooperative League believes that the program for United States cooperation with Euratom now before you can lead to practical experimentation in techniques for the production of atomic energy which will be of value not only to Europe, but to the United States as well.

As spelled out in the memorandum of understanding:

> both Euratom and the United States must carry through the nuclear revolution in industry with maximum speed and efficiency in order to remain in the forefront of progress and to open new horizons for further economic and social advance.

It will be to our advantage, as well as to theirs, to build large-scale nuclear-power reactors which can provide a laboratory for discovering techniques most necessary to reduce the cost of energy from the atom.

The Cooperative League is disappointed that the Atomic Energy Commission and the Congress have not seen fit to launch a "crash program" in the development of atomic reactors such as was spelled out in the Gore-Holifield bill as presented to Congress a year ago.

Certainly if that program had been enacted at that time we would have moved a long way on that road of practical experimentation.

If the administration is insistent that it is better to experiment in Europe than it is here at home, that at least will give American consumers the benefit of some experimentation.

We believe that such experimentation should have been carried forward here at home, as well as in cooperation with Euratom.

There are several points at which a word of caution needs to be said. There is some loose talk to the effect that the United States does not need nuclear power now.

Actually, there are areas in the United States where the costs of wholesale power are so high that atomic energy, even at its current costs, might well be commercially feasible in the face of the exorbitant rates which some of our organizations must now pay for that power.

There are still forgotten consumers, as far as electric energy is concerned, in the United States. It is for that reason we have pushed hard for experimental reactors here which might meet that present need.

May we also point out that the Euratom agreement alone will not solve the problem of energy shortage in the face of a Middle East crisis. We must remember that there are 60 million kilowatts of installed power in the 6 Euratom countries at the present time.

The new agreement provides only 1 million kilowatts more. This is less than 1.5 percent more energy. It may take 4 years to build the reactors now planned. At the time they are built they may well be uneconomic measured by some available sources of energy today.

The Euratom agreement will only be developing an auxiliary power supply and laying a foundation for freedom of those nations from limited energy resources.

Recommendations:

A. The Cooperative League heartily endorses the basic principles involved in the memorandum of understanding and believes that the amount of money involved in the proposal is modest enough so that the national interest will be well served in moving forward on this program.

B. The Cooperative League recommends that the program retain the highest possible flexibility in the progressive selection of reactors.

We believe that there should be no discrimination in the types of reactors which could be used under the program and that no reactor type should be excluded.

In a field as dynamic as that with which you are dealing, there is always the possibility of a breakthrough on reactor development which might well lead to the use of reactor types not now contemplated in the program.

C. The Cooperative League recommends that United States support in money and know-how be predicated on an effort to secure the maximum benefits of technological improvements, and that these benefits should be made available to all types of consumers.

Particular care should be taken to prevent the patenting of inventions developed under the program which might in any way restrict the welfare of consumers, either in the United States, the Euratom countries, or consumers in general.

D. The Cooperative League further recommends that in the implementation of this program it is of extreme importance to assure that the joint program shall be directed solely toward the peaceful uses of atomic energy. This should be assured by systems of inspection developed in cooperation with the International Atomic Energy Agency and by frequent consultations and exchanges and vigorous adherence to safeguards to control the health and safety of those associated with the program and in areas which might be endangered in case of possible explosion in an atomic reactor.

E. That the power generated in the atomic program be made freely available to consumers of all types through privately owned, cooperatively owned, and publicly owned facilities in order that we may assure the balanced free economy which is so essential to the development of a sound, yet dynamically free, economy for United States and Europe.

With a six-nation service area every effort should be encouraged to link all distribution together for a maximum effective use of such power.

In the years that lie immediately ahead of us all human resources must be involved in determining the future of mankind if mankind is to have a future at all.

The agreement between the United States and Euratom is one of the many steps we must take if we are to achieve both freedom and abundance which are essential to world peace.

Thank you very much, Mr. Chairman, we appreciate the opportunity to present this testimony to you.

Chairman DURHAM. Thank you very much, Mr. Campbell, for a very illuminating statement.

Senator Pastore, do you have any questions?

Senator PASTORE. Only to say that I think it is a magnificent statement. I agree with it wholeheartedly, every word and every line.

Mr. CAMPBELL. Thank you.

Chairman DURHAM. Thank you very much, Mr. Campbell.

The committee will adjourn until tomorrow morning at 10 o'clock.

I think temporarily the room will be the House Caucus Room.

(Thereupon, at 11:05 a. m. Tuesday, July 29, 1958, the committee was recessed, to reconvene at 10 a. m. Wednesday, July 30, 1958).

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PROPOSED EURATOM AGREEMENTS

WEDNESDAY, JULY 30, 1958

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met, pursuant to recess, at 10 a. m., in the caucus room, Old House Office Building, Hon. Carl T. Durham (chairman of the committee) presiding.

Present: Representatives Durham, Holifield, Van Zandt, Price, and Hosmer.

Also present: James T. Ramey, executive director; David R. Toll, staff counsel; George E. Brown, Jr., George F. Murphy, professional staff members; Capt. Nels R. Nelson, USN, consultant, Joint Committee on Atomic Energy.

Chairman DURHAM. The committee will come to order.

This is the fifth and final day of the public hearings of the Joint Committee on the proposed Euratom agreements.

This morning we will continue testimony from industrial and public witnesses.

I understand that our old friend Mr. Carroll L. Wilson, president of the Metals & Controls Corp. is here this morning.

Mr. Wilson. we are glad to have you with us again. You may proceed.

STATEMENT OF CARROLL L. WILSON, CHAIRMAN, EXECUTIVE COMMITTEE, METALS & CONTROLS CORP.

Mr. WILSON. Thank you, Mr. Chairman. I am glad to be here and I appreciate this opportunity to comment on the joint United States-Euratom program which is now before you.

Those who framed the first Atomic Energy Act of 1946—some are still members of this committee—and included within it this unique legislative mechanism could hardly have foreseen the present role and consequent responsibility of this committee in influencing the development of atomic energy and its integration into our political, scientific, and business instructions.

Frankly, there were times, when I was the General Manager of the AEC, when I was less appreciative and objective as to the role and mission of this committee. But I want to state in all sincerity my conviction that this committee has performed a notable public service during its first 12 years.

Many things have been done to move us toward the time when nuclear power may become competitive with conventional fuels. There has been an extensive development program in which industry has participated on an ever increasing scale.

Most of the information in this field has been declassified. The framework of law and regulation has been modified and extended through such measures as the 1954 Atomic Energy Act, the Price-Anderson bill, and the regulations and administrative rulings of the AEC and other Federal and State agencies.

Briefly stated, these have been the results:

1. Except for the Shippingport reactor, the only nuclear powerplants harnessed to real operating loads in regular service are those developed and built as part of the naval reactor program. More power reactors of various designs are going into service each year as part of the naval reactor program.

2. An encouraging variety of large and small nuclear powerplants financed with public funds and private capital in some cases; in others with public alone, in a few with private funds alone, are under development and construction.

Plans call for initial operation during the next several years. Not many additional large projects financed solely with private funds seem likely to be initiated in the near future.

3. Many kinds of experimental reactors are being developed to prototype stage as part of the reactor development program of the AEC.

4. Nuclear powerplants for the generation of electricity which are competitive in cost in the United States appear to be 5 to 10 years away. The remoteness of this industrial market for nuclear power reactors means that private companies cannot afford to place much of their engineering or management effort in this field, or their own capital.

For the most part, those companies large enough to do so have already placed their dollar and effort bets.

5. In Western Europe much higher fuel costs plus the need for importing an increasing percentage of the fuel required make economical nuclear power much closer.

One of the major problems in this new industry has been to find a means by which the early Euratom market can be served by American firms. Euratom is an important mechanism for solving this problem.

The ambitious program formulated by the "Three Wise Men" has been scorned as impractical.

Consider how much it would cost, and all the obstacles to getting it started. But I regard Euratom as a bold and imaginative way to catalyze interest and to introduce nuclear power into the energy systems of the six European Community countries.

Late last year this committee and the AEC separately called together representatives of the nuclear equipment manufacturers and the electrical utility companies.

The purpose of these meetings was to assess the condition of the nuclear power industry and to determine how it might be given greater incentive to hasten the advent of economical atomic power.

I concluded from the session I attended that there were two principal choices. One would be to leave the industry to evolve in the normal commercial pattern; that is, the pace and scale of development would be directly responsive to the market and profit opportunities, with the Government supporting only basic research and small-scale experiments.

If this choice were made it would probably be 20 years before nuclear power became economical.

The other choice would be to accelerate the pace, if considerations of national policy—especially foreign policy—justified it.

For this purpose substantial Government assistance would be needed.

The joint United States-Euratom program which has been worked out since those meetings last year serves to a remarkable degree to meet the needs for an accelerated program which gives United States industry an immediate market; the buyer a ceiling on costs, and adds a strong plus factor to our foreign policy.

Specifically this program satisfies the conditions needed for accelerating nuclear power development as well as national policy in the following ways:

1. It will increase substantially the tangible market for American nuclear equipment and fuel by creating a large, immediate requirement of 1 million kilowatts for "proven" United States types of reactors.

2. United States industry is aided in becoming identified with the development of the nuclear power industry in Western Europe.

3. Units will be large enough to furnish valuable operating experience in the whole fuel cycle.

4. A research and development program over a 10-year period is to be financed by the United States and Euratom, much of it to be available to aid industrial firms working to improve reactor performance and reduce fuel costs.

5. It involves none of the elements of the public-private power controversy.

6. It provides a combination of financing aids—fuel cycle ceiling cost guaranties, construction loans, etc.—to offset in part the higher costs of the 6 or 7 large stations to be built as part of the program.

7. It furnishes a solid foundation for Euratom to build nuclear power into the energy systems of the member nations and to start them on a course which may make them eventually much less dependent upon imported oil and coal.

8. Overall, the experience which the United States and its industries will derive from the program should help us reach the goal of economic nuclear power here at home much sooner than we otherwise would.

I believe that this United States-Euratom program is the most significant step in hastening the development of commercial nuclear power since the revision of the Atomic Energy Act in 1954.

As to details—many must be worked out as the program proceeds. Many can only be worked out as actual projects are selected and specific agreements to cover them are negotiated.

I can see difficulties in specific features, but the program impresses me as a bold, timely, and constructive measure to provide an industrial incentive which has been a critical missing link to date, an assured market for a million kilowatts of nuclear generating capacity of types to be selected in 1959 with construction to be completed by 1963.

It limits the risks of the buyer—utility—to tolerable levels; it provides sufficient financing to enable the balance to be covered, and information growing out of the program is to be widely available.

Of course, it would be better if the Euratom had resolved how the third party liability question would be met, if there were greater assurance that proprietary commercial information developed at private expense would be less exposed to dissemination and use, and if the mechanics of the fuel guaranties were more explicitly spelled out.

But in each of these matters agreed principles or objectives have been defined.

For example, it is clear that protection against third party liability must be made available to cover equipment manufacturers and suppliers, as well as the participating utilities, against presently uninsurable risks.

It is the responsibility of the Euratom Commission:

To develop and secure the adoption, by the earliest practicable date, of suitable measures which will provide adequate financial protection against third party liability.

A good deal of pioneering has been done in this country in developing ways of providing such protection.

The Euratom Commission recognizes that implementation of the whole program is contingent upon their finding an early solution to this problem and, consequently, I am confident they will find one.

A part of the plan which puzzles me concerns the kind of relationship which is assumed to exist between a United States manufacturer and a firm in Europe. Ordinarily, commercial arrangements between a United States manufacturer and a manufacturer abroad are based, among other things, upon licensing under patents held by one or the other or both and confidential and exclusive exchange of technical information and know-how between the two parties.

Because of the provisions for broad and general dissemination of information—at least as regards the results of the proposed research and development program—I do not see a viable basis for the normal commercial relationship between the United States fabricator of fuel elements and "the manufacturer in Euratom countries under agreement with a United States firm or firms."

Yet I recognize how important it is that knowledge and experience arising from such a program be widely available.

There is thus a basic conflict here between normal commercial practice and the needs of this plan. Joining in the program is optional. Those United States firms who do participate must accept this feature of the plan as well as others, and accept the restrictions which follow.

Actually, such a large part of the technology in this whole field of nuclear reactors has been developed at Government expense with consequent Government rights to the resulting information and patents, that the subject of continued public availability of information may be more a matter of theoretical and emotional concern than of practical importance.

A most important and ingenious feature of the plan is the guaranty of fuel-cycle costs and the assurance of chemical processing services. These features also permit United States industry to meet British competition in the Euratom market.

The United States offers a package guaranty on fuel-cycle costs, including a ceiling cost for fabrication and a minimum life for fuel elements in the reactor.

If fabrication costs exceed the ceiling, or if the life of the elements falls below the minimum, the United States Government will stand the difference to the extent that these expenses are not met through private guaranties furnished by the supplier.

The result is that the Euratom utility will be protected against costs rising above the standard fuel-cycle cost for his reactor.

In extending such a guaranty, the Government asserts a right to have access to records pertaining to the work to which the guaranty applies. This is probably necessary.

But I see no reason why the Government should acquire any rights to make the information so acquired available for use by others, merely as a consequence of its guaranty.

Defining how fuel life or burnup within the core will be measured is something which can be worked out by reasonable people. The problem is to define irradiation level within the core.

The flux pattern will vary a lot from the center to the outside, for example. As a result, the cumulative irradiation at the end of any period of reactor operation may be 2 or 3 times as great for fuel elements at the center as for elements at the edge.

If the fuel-element positions are changed from time to time, the irradiation levels reached in the elements may be equalized to a considerable extent.

For example, a fuel-element supplier may be prepared to guarantee any one of his elements for irradiation levels up to 5,000 megawatt-days per ton. But if the Government guaranty were based on the average irradiation level of all the elements in the core, and no change of positions of elements were made to equalize burnup, some of the elements might have been exposed to irradiation levels of 10,000 or 15,000 megawatt-days per ton by the time the average burnup of the whole core reaches 5,000 megawatt-days per ton.

It is the failure of any fuel element which leads to shutdown of the reactor and replacement of part or all of the core.

Therefore, a measure of fuel-element performance must be worked out so that the guaranty is related to the maximum irradiation level to which any single fuel element is exposed.

During the last several years, our company has been intensively engaged in the fabrication of fuel elements of a variety of kinds. As a fuel-element fabricator, I must admit concern at the prospect of being the agent through whom the United States Government guaranty on fuel life and cost would be extended to Euratom utility.

Whether this role will be acceptable will depend a good deal upon the spirit in which the AEC negotiates and administers such arrangements. If its purpose is to assist the fabricator and to fulfill the minimum guaranty by that amount which the fabricator is unable to assume, I am confident that mutually satisfactory arrangements can be made.

On the other hand, if the purpose of the AEC and its contracting officers is to push the maximum risk on the fabricator and to minimize the obligation of the Government, I can foresee hazards and risks so great that only companies of great size could accept them.

I have heard the objection that a scale of effort of such size as this program contemplates, centered on proven types of United States reactors, will tend to slow down the development of better types.

It would be unfortunate if the AEC failed to encourage and to support liberally the development of a whole spectrum of reactor types.

But it is my understanding that the Euratom program would be in addition to the continuing AEC program of reactor development and in no sense a substitute for vigorous domestic development work.

It is said that the program is too complicated and detailed. As to its complexity, this seems to me inevitable. The plan, necessarily, has many parts in order to provide a complete framework.

The need is to match an evolving United States industry—which is incomplete in such important respects as chemical processing—with the needs of a Euratom utility buyer who must pledge his general credit in raising money to buy these stations. The buyer must be able to figure his costs within tolerable ranges.

The plan has been criticized because the actual inspection to insure against diversion of special nuclear material for military purposes is to be performed by Euratom.

But it is very clearly stated in the memorandum of understanding that everything is contingent upon Euratom establishing and maintaining a safeguards-and-control system satisfactory to the United States.

The risk, to me, seems small, especially in view of the complete availability of operating data and full access to all of the plants.

This committee now has before it the opportunity to enable the nuclear-power program in this country to take a major step forward and, at the same time, to make a significant and timely contribution toward implementing a foreign policy aimed at strengthening our bonds with Western Europe and providing new foundations for their economic growth and close association with one another.

It is regrettable that these proposals came to you so late in the session. I know you are under great pressure to complete the work of this 85th Congress. Yet a great deal of diligent and effective work must have gone into the elaboration of so complete and practical a plan and the negotiation of the resulting agreements in which so many parties were involved—the six Euratom nations plus the various departments of the executive branch whose concurrence was necessary before the plan was in proper form to present to you.

In his message transmitting these proposals, the President stressed the urgency of action. Events since June 23, the date of his message, surely accentuate the urgency for action now, both in order to lay the foundations for an energy system for Western Europe less dependent on Middle Eastern oil, and to create additional ties of common interest and purpose between the United States and the member states of the Euratom Community.

As a tangible and meaningful expression of our purpose to share with our friends the peaceful applications of atomic energy in order to strengthen their economies, I believe this joint United States-Euratom program is the most important international action the United States has taken since we first submitted to the United Nations in 1946 the Acheson-Lilienthal-Baruch plan for international control of atomic energy. This plan now before you will strengthen the

economies of the Euratom nations and start them along the road of lesser dependence on imported fuel. It will show the world that we are ready to share in a big way with other nations the fruits of our leadership in nuclear power.

I urge that you take whatever measures are possible within the time available to place your endorsement on this program and to recommend for enactment by this Congress such legislation as will allow this program to get underway now. Next year may be too late.

Chairman DURHAM. Thank you very much, Mr. Wilson. That was an excellent statement. It certainly is very thought provoking on the subject which, of course, we all take seriously. As you stated in your statement, it is a little bit unfortunate that we did not get this up here until very late in the session. You are all familiar with the problems we face here in enacting legislation at this late date in this session of Congress. But this committee takes it seriously, and we shall do the best we can under the conditions.

Mr. Holifield, do you have any questions?

Representative HOLIFIELD. Yes; we are always happy to have you before us, Mr. Wilson. It takes our minds back to the early days of the Commission, when you were the General Manager and when our concern was mostly in the weapons field.

Mr. WILSON. That is right.

Representative HOLIFIELD. We are glad to have you before us as a witness. I have hurriedly looked through your statement, having arrived a little bit late. There are several points I would like to talk to you about. You bring out the fact that, unless the Government supports this industry, it will probably be 20 years before nuclear power can become economical.

The fact is that most of the private industries have placed such bets as they plan to place on the industry, and they now come before the committee seeking some form of subsidy in order to continue in the industry.

Some of us, in 1954, you know, predicted that this would happen, and industry at that time told us that all they wanted was for us to open the gate and they would solve all the problems that needed to be solved.

We are glad to see industry coming with its hat in its hand and admitting its mistakes to this committee.

Now, with that clearing of the atmosphere a little bit—I do not expect you to comment on it, naturally—why, there are certain things in this program which, I think, concern some of the members of this committee, and maybe most of them.

One of them is that this, apparently, will be confined to a very limited type and that the starting of all these six reactors at the same time and the completion at practically the same time will preclude the advantage of consecutive steps in each type program which would thereby give us the benefit of enlarged technology as we go along.

There is some concern in our mind on putting this much money in what, of necessity, must be 2 or, at the most, 3 different types of reactors and, possibly, near identical reactors in any stage.

We are somewhat concerned about that. Do you have any comment on that? In other words, we would hate to have 3 or 6 Shippingports starting now and ending in 1963, none of which would be substantially different in economy and efficiency.

Mr. WILSON. As I understand, the problem was to accommodate, in part, a program now which would have sufficient scale and impetus to permit Euratom to build on top of that toward its 10-year goal, which means getting several stations going quickly.

Representative HOLIFIELD. This is what complicates it; the problem of obtaining a million kilowatts by 1963 of a so-called proven type of reactor, which means that you may get the kilowatts, but you may not have much advance in technology. We can do that, you know, with six more Shippingports.

Mr. WILSON. Suppose, for example, there were 3 major types of reactors selected for this program, of which there were minor variances of each to make up 6 stations. As I understand, one of the purposes of the research and development program is to improve the fuel performance and reduce the fuel cost, which means lengthening the life of the fuel elements and reducing their fabrication costs.

Representative HOLIFIELD. Of course, we are doing that now on the fuel research and development with new cores of the Shippingport and new cores of the naval reactors. We are doing substantial work along that line now, and there are more appropriations in this year's budget for that.

Mr. WILSON. Yes, but I think there are great opportunities that lie in the field of reducing cost and, therefore, improving this reactor performance in terms of becoming economically competitive, and in successive cores in any given reactor you can reflect the improvement in fuel technology. It is this part of the core of the whole reactor system that is most subject to change and, I think, improvement in its costs.

Representative HOLIFIELD. But you are going to start them all at the same time, practically, in the year 1959.

Mr. WILSON. Yes.

Representative HOLIFIELD. You are going to complete all in 1963, you hope?

Mr. WILSON. Yes.

Representative HOLIFIELD. Therefore, you are going to have, you might say, practically the same type of fuel rods, because it will be at the level of the 1959 technology at which these fuel rods are fabricated.

Mr. WILSON. The second cores could be in the 1962 technology and could be substantially different and, I should think, significantly less costly.

Representative HOLIFIELD. Of course, that can occur without building these reactors, too. We have other reactors that are being built, including the Shippingport reactor, the naval reactor, and some private reactors that will be on the line before then in which these same experiments can be made. So, what we are doing is doubling up here and expending money in duplicate over that which is being spent now, and we are using this as an excuse to justify this program.

Mr. WILSON. The point has also been made, and I think you have made it with considerable force, that we need the experience of large stations, in part, to really bear out the actual cost of nuclear power.

Representative HOLIFIELD. But I have never contemplated them being all approximately the same type. I am not so sure but what these will turn out that way, particularly if this proven requirement is not eliminated from the statutory language. I think there are several

things that have to be done. I think your 1963 completion date has to be acknowledged, and most people do acknowledge, as being unrealistic.

I think that might be set up as a goal, but certainly if we are going to be realistic and if we hope to get progressive increases in technological results we would have to stagger the construction of these reactors over a longer period than the construction time of 4 years.

Is that not true?

Mr. WILSON. If we were going to have significantly different types, I agree. Won't the question of what is the problem be dependent in part upon what the Euratom utilities are prepared to pay?

Representative HOLIFIELD. I think so. I am glad you brought the point up because I think this is a very important point.

If the Euratom buyer is persuaded that a certain technology offers him a more economic goal, certainly his willingness to put miscellaneous money into that, and I would say also if that willingness was backed by substantial scientific data and cofindence on the part of the American manufacturer to build that type, to put his reputation on the line, that this would be a lot more important in this program than setting up a rigid formula which would hold the building of these plants to the one goal of constructing a kilowatt-producing plant regardless of technology and the goal of confining to rigid types, possibly BWR or PWR, this technology.

Mr. WILSON. If you and I were a Euratom utility mission, deciding what we would pledge our credit for in order to raise money to buy one of these stations, we would certainly examine with great care the state of developments, the probable reliability and the probable cost over the first core and perhaps the second core that we would buy.

I would suppose that the question of proven types would tend to be determined in considerable measure by what the buyer is willing to pay.

Representative HOLIFIELD. I think so, too. I think this is probably a more reliable guiding factor for us at this time to look into the crystal ball of the future and prescribe rigid types if we are going to get increased technology. If we just want some more kilowatts we will just build more Shippingports, that is all.

Mr. WILSON. That is right. Isn't this the combined purpose: A—kilowatts, and B—large-scale operating experience which will give us technical data and knowledge that small plants cannot furnish?

Representative HOLIFIELD. Yes; I think that is the combined goal as set forth in the supporting documents, but I think there is an inclination probably to overlook some of the factors that I have brought out and go on to the pleasant factors of solving the Middle East oil problem immediately with it and a few little window dressings, which sound very good in debate on the floor, but they have very little substance behind them.

That is why I am bringing this out.

Now, on the third-party liability, I would say as a member of this committee I cannot support this program unless this is taken care of by the European country in which the buyer exists.

If there is any liability on the part of the United States Government, such as we have assumed in our own country, where we have control of the operation of these reactors and which may or may not be justified, if there is any doubt on this, and I think this ought to be

written in the statute also, that there be no deal with any country who would not assume the third-party liability.

We should have that understanding in the statute right to begin with because when we build reactors in a foreign country and it is subject to the operation on the part of the foreign reactor operator, you and I both know why the factor of liability can be very large in the type of operation.

Therefore, without any real basic fault in the reactor which has been manufactured here, or the fuel rods, the miscellaneous operation could cause liability which I do not think any American manufacturing plant or the Government should be liable for.

Mr. WILSON. I agree. It seems to me the only question is whether this must be firmly and finally settled before a general endorsement of this program is given or whether it is something which is so clearly a must for both the American supplier and for the United States Government that in fact no stations will be started for projects selected until this question is resolved.

Representative HOLIFIELD. All right. Would it not be to the advantage of the American manufacturer to say "Here, you must set your house in order. You must solve this problem before we can enter into a contract with you."

Or do you want to let this remain hanging in the air until some faulty operation causes a catastrophe and then you have all the trouble on your hands of a substitute for damages, maybe international complications and so forth, international feelings, certainly.

Mr. WILSON. There are a lot of things to be worked out. I would suppose in any contract to supply fuel elements or reactors a United States supplier would make the execution of that and its implementation contingent upon satisfactory third-party liability protection.

Representative HOLIFIELD. This may or may not be so. I have no knowledge on that point. I would assume so in view of the diligence that would be exercised by a financial company in this field, but our responsibility is setting up the guidelines of a program here where the Government has an implied liability and an expressed liability in some fields.

It would seem to me it would be better to write this into the implementing statute, that there should be no agreement which would incur third-party liability.

Mr. WILSON. This would make it more explicit, the obligation of Euratom that it must, in advance of the conclusion of these arrangements, have secured and given adequate assurance on the third-party liability question. It is given the assignment, as I understand it, in the agreement.

Representative HOLIFIELD. Sometime you have to give people a little bit of a push and it helps. It might even help American industry to have a little push behind this particular point.

Now, on this guaranty of fuel life this is quite a field, these fuel guaranties.

Let us assume that two manufacturers, A and B, are competing for a reactor contract with country X. A realizes that it has a 10-year guaranty or 10,000-megawatt guaranty and B realizes that.

Country A makes a real effort from the standpoint of their facilities and their abilities and their background of experience and all, to

bring a fuel element that will, let us say, either meet the 10,000 megawatt-days or come up to 80 percent.

Company B, on the other hand, with good intent, but with poor ability in this particular field or maybe poor scientific or engineering staff, makes an element, makes it very cheaply, they have very little invested from the standpoint of their own scientific research and development, and the element only lasts 20 percent of the 10,000. Say one-fifth, 2,000 megawatt-days.

In the one instance company A has made a real effort and the Government has to step in and pick up 20 percent, let us say, of the fuel-element life.

In the second case, because of many things that might happen, company B, the Government has to step in and pick up 80 percent of the fuel-life liability.

Now, it seems to me we have to pin this factor down so that there is a responsible effort on the part of each fuel manufacturer to get the ultimate at this time.

The way the language of the act is written and so forth, there is a blanket liability regardless of operation, and you have brought out in your statement how the rotation of fuel elements from the core to the outside could establish a level of irradiation which would not occur if they were not rotated and operated properly.

So it is not only in the fuel manufacturer's effort, but it is also in the operators procedure that this fuel life, which brings about a liability on the part of the taxpayers of the United States, occurs.

Now, are we going to solve that problem? Can it be solved through an arbitrary limitation of Government liability.

Let us say the Government will guarantee these fuel cycles that in no instance will it guarantee over 10 percent of the 10,000 megawatt-days or 20 percent, or whatever the scientific community thinks.

We have letters from some manufacturers that they want no guaranty, they do not want the Government to guarantee anything.

In most instances we have had letters saying they want guaranties. None of them specify how much. They just want a blanket guaranty of subsidy.

Mr. WILSON. You touched very briefly on the matter of how you handle this. I speak of this in my statement. I am sure that a definition will have to be worked out that will limit the guaranty of any element to a given level, whatever it is, 10,000 megawatt-days.

But I suppose that the purpose of this sliding scale of Government obligation of underwriting may have been due in part to a desire to allow greater latitude for less proven types of fuel elements.

Representative HOLIFIELD. Does this not come down now to the confidence that the manufacturer and the buyer has?

Mr. WILSON. Yes, sir.

Representative HOLIFIELD. In other words, here is this manufacturer B who comes up in competition with manufacturer A. Manufacturer A is willing to take a 20-percent limit on the fuel life, but the other manufacturer would not be willing to do that.

Would this, or would this not, be a justifiable reason for the buyer to beware?

Mr. WILSON. I am sure it would. I would expect the buyer to look rather closely at the real quality of the fuel elements supplied.

Representative HOLIFIELD. Why should he when the Government is going to guarantee it for 10,000 megawatt-days?

He wants to be with this particular company. He looks at the fuel guaranty with company B; he has no concern with the liability that the Government is to assume. He knows he is going to get the 10,000 megawatt-hours. Why should he be worried?

Mr. WILSON. Let us assume identical types of cores and manufacturer A is willing to guarantee 8,000 and manufacturer B 2,000.

It seems to me that the utility operator, apart from this guaranty, will have an interest in the reliability and the on-stream time, and so forth, of his station.

Representative HOLIFIELD. He might have an interest in a cheaper price, too, which manufacturer B might offer, might be willing to offer.

Whereas, on the part of the manufacturer A, he might offer a higher price because he realizes his need for a higher price for the better type of fuel element which he manufactures.

Mr. WILSON. I would think regardless of the guaranty the buying utility that is operating the station would want to have a high assurance of reliability in it.

May I take another example.

Suppose there are two different kinds of fuel elements. One that is proven, let us say, and on which there is a lot of operating experience. Let us say this is "the most proven" type.

On this a private manufacturer would be prepared to give the maximum guaranty of life, but if it is a less proven, but interesting type in terms of learning more about its technology the private manufacturer might say there is not enough operating experience, "I cannot stick my neck out beyond 3,000 or 4,000 megawatt-days."

Yet it might be something which if installed in a reactor could add substantially to our knowledge and technology and understanding of new types.

Representative HOLIFIELD. Should this not be done, though, in a research experiment rather than in a full-scale reactor?

Mr. WILSON. There are limits to the degree to which you want to run a 100,000 kilowatt-station as a pilot plant.

Representative HOLIFIELD. If a percentage of liability on fuel guaranties were explicitly spelled out—and I notice you say "If the mechanics of the fuel guaranties were more explictly spelled out—what percentage would you say at this time in the course of technology would be a fair one to apply to at least three types which might possibly be chosen, BWR, PWR, and possibly an organic moderated and maybe the homogeneous. If I recall right, the organic moderated people have given a guaranty to their people.

Mr. WILSON. I don't know.

Representative HOLIFIELD. In the SENN project. Reportedly, I do not know this but rumor has it that there has been a guaranty made to the SENN people in Italy on fuel life by the builders of the organic moderated type of reactor. That may or may not be true. I am not giving this as verified. I know there is a fixed price on the Consumers of Nebraska. There is a fixed price on the Piqua project. I am not sure whether the guaranties of fuel are fixed or not, there. I think they are, because it all rests upon the final kilowatt cost.

So, it must include fuel guaranties.

I think General Electric are giving a guaranty to Commonwealth-Edison, the Dresden project.

I think there has been a guaranty given to those people, also.

Mr. WILSON. In response to your specific question, as to what kind of guaranty a fabricator today might be prepared to give on different types of fuel, a lot of specific questions must, first, be answered. They relate to the operating conditions of the reactor itself, the percentage above rated capacity, temperature, pressure, and so on, which will be considered standard operating conditions. I think it would be very hard to generalize, and I could not do it, as to what specific level of megawatt-days burnup a fabricator should now be prepared to give.

Representative HOLIFIELD. Should a man go into this who would not be willing to guarantee 50 percent of that fuel life? Should a manufacturer be subsidized by the Government if he could not, personally, guarantee 50 percent of the fuel life.

Mr. WILSON. I think it depends upon the type of fuel. If it is one which has a considerable body of operating experience—let us take a PWR type—here there is more operating experience than any other.

On such an operation—I don't happen to be familiar with the figures—he should have a higher assurance of what he can obligate himself for than for a much less proven type of fuel, but one which might be considered very desirable in this program.

Mr. RAMEY. In the specifications for a project, would it not be expected that they would specify a minimum period in the specifications for the fuel life so that a man would, normally, probably get some type of competitive proposal so that you would have a sort of base to go from, a fuel-element manufacturer would have to sort of, at least, meet the specifications?

Mr. WILSON. He would have to, or his bid would not be responsive.

Mr. RAMEY. I think what Mr. Holifield says is that, maybe, the agreement for cooperation, or possibly the authorization legislation, ought to set out some minimum or some basis for establishing such minimum.

Representative HOLIFIELD. I am not sure where that should be, but, certainly, to impose some type of real incentive on the manufacturer of that fuel rod, it seems to me there should be a limitation on the Government liability, in fairness to other manufacturers who are putting on the block their experience and their expenditures in this field.

It seems that there should be some limitation whether that limitation should be 10 or 20 percent at this stage of the art; I am sure I am not qualified to say. Certainly, I think a consensus of scientific consultants might say that we feel this program could succeed, if it is desirable, on the basis of the 20 percent of the fuel-life guaranty.

Mr. WILSON. Your point is that there should be some floor, as well as ceiling of 10,000 megawatt-days?

Representative HOLIFIELD. You say in your own statement:

> The United States offers a package guaranty on fuel-cycle costs, including a ceiling cost for fabrication and a minimum life for fuel elements in the reactor. If fabrication costs exceed the ceiling, or if the life of the elements falls below the minimum, the United States Government will stand the difference to the extent that these expenses are not met through private guaranties furnished by the supplier.

This brings up the point. What are the private guaranties? Is there a floor upon which they should be willing to rest their own prog-

ress, their own profits, and their own background of experience or not, or whether that floor should be zero?

The result is that the Euratom utility will be protected against costs rising from standard fuel costs of the reactor.

That is true—but will American manufacturers be protected from unlimited competition in this field from those who are not capable of producing an excellent product?

You go ahead further. You say:

> In extending such a guaranty, the Government asserts a right to have access to records pertaining to the work to which the guaranty applies. This is probably necessary. But I see no reason why the Government should acquire any rights to make the information so acquired available for use by others, merely as a consequence of its guaranty—

Taxpayers pick up the check for the liability, but, generally, industry in the United States and the general public is not entitled to anything that results from the expenditure of taxpayers' money.

It is a one-way street, as I see it.

Mr. WILSON. I would expect, going back to Mr. Ramey's remarks, that the specifications of the buyer would, in any case, set up certain life requirements of the core. If the fabricator were not prepared to guaranty 2,000, 4,000, 6,000, 10,000 megawatt-days, his bid would not be responsive.

Representative HOLIFIELD. On the other hand, if you impose a too rigorous limit of liability, you automatically throw the business into the hands of maybe two manufacturers in the United States who are willing, because of their background of technology, which has been acquired mostly at Government expense, due to being participants in the contracts on building different types of reactors; they are in a position now where they can come out and guaranty these fuel elements, maybe the full 10,000-megawatt guaranty they are willing to give, and this, in turn, will go against a relatively small company, such as yours and others, that wants to get into the game.

Mr. WILSON. This is the other horn of the dilemma because, presumably, it is in part to permit participation of companies that can take less financial risk, that there is latitude in this fuel-life guaranty.

Now, whether there should be a floor under it, I really don't know. I cannot name a number.

Representative HOLIFIELD. With your background of knowledge, if you cannot name a number, look at the position it puts us in.

Mr. RAMEY. As a fuel-element fabricator, would you object to some sort of standard being put into the law or the agreement for cooperation or the agreement between the Commission and the fuel-element fabricator that would be a kind of most-favored-nation clause, saying that, within a reasonable time period, the price that is quoted to the utility or to the equipment manufacturer for the fuel element will be no higher than the price that you are quoting to any other manufacturer for the same type of fuel element?

I think one thing that has worried some of the committee is that this guaranty might just result in your fuel-element manufacturers increasing their prices a little bit and thereby getting taken care of by the Government.

Mr. WILSON. It is my impression that the impact of competition in this field will take care of this, Mr. Ramey. This is a competitive field.

(Discussion off the record.)

Representative HOLIFIELD. On the subject of fuel fabricators, how many fuel fabricators do we have in the United States?

Mr. WILSON. I suppose we have perhaps 8 or 10, perhaps a dozen. I am not quite sure; it depends on what scope of fuel fabrication you are referring to. There is a certain group of companies that are currently, let us say, furnishing fuel for the naval reactor program.

Representative HOLIFIELD. Could you, from memory, give us the names of some of those, and then furnish us a complete list, so far as your knowledge is concerned, later?

Mr. WILSON. I shall be glad to furnish a list insofar as I am familiar with these companies.

Representative HOLIFIELD. If you are in the business, you probably know who your competitors are.

Mr. WILSON. Certainly, we know some of them.

Representative HOLIFIELD. Can you think of some of their names now? I just would like to know.

Mr. WILSON. Certainly, the Westinghouse Co., Babcock & Wilcox, Combustion Engineering, Olin Mathieson, Sylvania-Corning. These occur to me at the moment as being manufacturers.

Representative HOLIFIELD. Your company?

Mr. WILSON. Oh, yes; Metals & Controls—I forgot.

Representative HOLIFIELD. I wanted to be sure that your company was listed. Are there any small companies, outside of yours?

Mr. WILSON. It depends on your definition of "small." We claim to be a small company at Metals & Controls compared with most of those that I have named.

Representative HOLIFIELD. Are there other small companies?

Mr. WILSON. I am sure there are, Mr. Holifield. May I supplement my remarks by giving a list insofar as I can?

(In addition to the firms mentioned in his testimony, Mr. Wilson subsequently informed the committee that the following companies are also engaged in fuel element fabrication:)

General Electric Co.
Nuclear Metals, Inc.
Clevite Corp.
Makepeace division, Engelhart Industries.

Representative HOLIFIELD. Yes. You are bringing up the point of operation of these fuel elements that, I think, is quite important because it has a direct bearing on the Government liability. I think it is a valuable part of your testimony. I also want to compliment you on the statement:

It would be unfortunate if the AEC failed to encourage and to support liberally the development of a whole spectrum of reactor types.

Those are all the questions I have, Mr. Chairman.

Chairman DURHAM. Mr. Van Zandt.

Representative VAN ZANDT. I have no questions.

Chairman DURHAM. Thank you very much, Mr. Wilson.

Mr. WILSON. Thank you, Mr. Chairman.

Chairman DURHAM. The next witness is Mr. Walter Hamilton, manager of contract operations, Nuclear Development Corporation of America.

Walter, we are glad to have you back this morning.

STATEMENT OF WALTER HAMILTON, MANAGER OF CONTRACT OPERATIONS, NUCLEAR DEVELOPMENT CORPORATION OF AMERICA

Mr. HAMILTON. Mr. Chairman, I have with me Mr. Howard Schwartz, who is assistant to the president of NDA and formerly a member of the staff of the AEC. He also has been in the committee room before, in a different role.

I would like to start by saying that Mr. Menke, president of Nuclear Development Corporation of America, was very sorry he could not come down here today, himself. He is out of town for the week. I would like to read the statement that he would like to have made if he could have come, and then make myself available for questioning.

Chairman DURHAM. All right; you may proceed.

Mr. HAMILTON. Mr. Chairman and members of the committee, I am pleased to have this opportunity to express my views of the proposed Euratom agreements. I have already communicated some of my thinking on the matter in response to specific questions contained in Mr. Durham's letter of June 28. I assume that, by now, these have been distributed to you by the executive director, Mr. Ramey.

There appears to be a genuine market for nuclear power in the Euratom nations now. The current international situation, particularly in the Middle East, lends further emphasis to this need. We have an opportunity to assist our friends abroad and make a practical demonstration of the principle of atoms for peace to the world.

To be truly helpful and responsive to the needs of Euratom, a cooperative effort involving the following basic elements is essential:

(1) Some reactors involving essentially no development work must be selected and started in construction by Euratom immediately.

(2) Some reactors not yet wholly proven but better suited to European needs must be planned for construction by Euratom within the next 2 to 3 years. Specifically, development work on the heavy-water reactors operable on natural uranium must be accelerated to meet this requirement.

Representative HOLIFIELD. Would you want us to wait until you give us your testimony, Mr. Hamilton, before we question you?

Mr. HAMILTON. As you wish; if it is on the second point, there is further testimony on this point.

Representative HOLIFIELD. All right.

Mr. HAMILTON. (3) The desire of the Europeans to acquire real competence and independence in reactor technology must be recognized. United States delivery of reactors ready to operate will not accomplish this purpose. The cooperative programs must, instead, provide for close working relationships between European and American groups in which the European scientists and engineers will have an opportunity to learn in the process of doing.

Our company has had experience in this kind of close working relationship, which I will describe briefly later. We have found it a mutually satisfactory way of doing business and are ready to participate fully in its formal extension to the Euratom group.

The specific documents before you include an international agreement, an agreement for cooperation, a memorandum of understanding,

and a set of working papers. They range in detail from a very general statement of intent to cooperate to a complex set of business arrangements.

Every significant body of opinion in the United States subscribes to the general principle of cooperation with Euratom. With respect to the details of the proposed business arrangement, however, there are sure to be varying degrees of approval and disapproval. The finest degree of detail which you are asked to approve is contained in the agreement for cooperation, which outlines the terms and conditions of cooperation in still a fairly general fashion. It presents but one of many possible alternatives that might have been considered.

It is unique, however, in the one major respect that it represents a basis for doing business which has been hammered out by members of both sides after long deliberation. My attitude in reviewing the agreement for cooperation has, therefore, been not to determine whether this is the best of all ways to do the job, but rather to establish whether it will do the job within those basic principles which I have outlined above.

I have the feeling that it is vital to have congressional approval, this session, on something that goes beyond the mere statement of intent to cooperate. This statement, as contained in the international agreement, is not enough. A document in at least the detail of the agreement for cooperation is necessary.

Delay in approval of such a document would be a serious political and economic blow to the Euratom group and inimical interests are likely to make the most of even highly motivated delay. The desire for getting on should not, of course, be substituted for the exercise of sound judgment.

I have reviewed the agreement for cooperation with considerable care and am ready to support the program as outlined. I believe the agreement is basically sound and would represent a real step forward. The Atomic Energy Commission and the Department of State have done a commendable job in negotiating and drafting this accord.

My support notwithstanding, as I read into the finer structure contained in the memorandum of understanding and the working papers, I found a number of areas in which I believe further clarification is desirable and necessary. The agreement for cooperation itself is adequately flexible to encompass the points I wish to draw to your attention, but I feel it important that the record be clear on these points at the outset. Such clarification can be handled separately, if necessary, in letters of exchange accompanying the agreement, or perhaps by reference in the committee's report.

First of all, the requirement that reactors under this agreement be of proven types needs amplification.

Prudence would dictate that at least a portion of this large effort in dollars and man-hours be devoted to enlargement of the art to guard against too rapid obsolescence. While the primary desire may be to get reactors on the line quickly, 2 of the 6 reactors in the construction program should be set aside for reactor types not yet wholly proven but more directly meeting European needs.

The AEC's concern in limiting consideration to proven types is understandable. The performance of these reactors will be important to the reputation of the United States and they should represent our best efforts. Nevertheless, a too narrow interpretation of proven

types may lead to the undesirable charge that the United States is saddling the Europeans with obsolete reactors against their better judgment. Explicit provision should be made for initial selection of reactor types by Euratom, subject to AEC approval, and admit of the possibility of including at least some reactors which require more development.

I would also suggest some flexibility in the matter of schedules. I feel sure we need to allow more time to mobilize and execute an effort of this magnitude. We should also leave room to incorporate the substantial developments likely to take place in reactor technology in this country over the next year or two. A target date of 1963 might still stand as the goal, but flexibility to extend a year or two beyond that date would seem highly desirable. The selection of reactors might then be spread over a period of, say, the next 3 years to assure a progression of improved types, or improvements within a type.

I would next call your attention to the role of the heavy water reactor.

Our experience in Europe, both directly and through our affiliate, NDA Europe, has been that this class of reactor still holds considerable interest. I do not need to detail the reasons for that interest to this group. The United States is in a particularly favorable position to provide assistance in this area because of its heavy water production capacity and related reactor experience.

While the heavy water reactors are neither specifically included nor excluded from the agreement, the forms of assistance outlined in the memorandum of understanding would indicate that little thought has been given to this type of reactor. These forms of assistance are geared to the significantly enriched systems which are typified by comparatively higher fuel costs and lower capital costs. A general statement of intent to provide equivalent assistance to heavy water reactors would be in order. Because of their different economic characteristics, the forms of assistance should be recognized as possibly being different in type and degree.

For example, free use or ban of heavy water might be included. Fuel warranties to 2 mills per kilowatt-hour might be equivalent to the 4 mills per kilowatt-hour warranty offered for the enriched systems. Some temporary direct capital costs assistance might be considered as an alternative, since the heavy water reactors involve typically higher capital costs and lower fuel costs and will be first-generation reactors. It is particularly important that the development of this reactor type be carried out cooperatively.

As you may know, we at NDA have devoted a significant portion of our efforts to the heavy water system.

I would like to state for the record that we stand ready to share this experience with the Euratom group. As an individual company, we have taken the initiative in suggesting a cooperative effort with a number of our European friends in the power reactor field. We have borrowed the term "International House" to refer to our program. Our concept is to assemble a group of competent technical people from overseas and integrate them temporarily into the NDA organization so that together it might be possible to arrive at more broadly considered solutions and decisions with respect to reactor cycles and types best suited to European needs.

This idea is an outgrowth of a similar and very successful venture undertaken with Mr. De Heem, of CEN, and his staff at Mol, Belgium. That is the laboratory which the committee visited last year, I believe.

We were chosen to design and develop an advanced engineering test reactor in the 25–50 megawatt-heat range. We undertook to take on a rather large number of Belgian engineers to participate in the job. These men, some 30, all highly qualified engineers, became part of the NDA staff in White Plains, receiving normal supervision.

The resulting design and development work, though primarily an NDA product, was, I feel, improved by the active participation of this group. The reactor is now under construction and proceeding very well. The construction is being carried out by Belgian firms under the supervision of the same group formerly attached to NDA. This construction phase also is being done cooperative. NDA has retained responsibility for the provision of a number of key components such as the fuel and the beryllium moderator pieces. Under this arrangement we have actually transferred know-how to the Belgians and increased their capabilities in the field. We were happy to do this.

This has been a mutually satisfying cooperative project. Each side has benefited from the other and has truly complemented the talents of the other.

I might interpolate in my printed statement to say this is the largest reactor project involving an American firm presently in an advanced state of construction in Europe.

Representative HOLIFIELD. What is the size of it?

Mr. HAMILTON. It has a design rating of 50 megawatts thermal. It is a completely new reactor of European choice, not a duplicate of a reactor in the United States. This was their choice. This was the decision they made of the direction in which they wanted to go.

Representative HOLIFIELD. Is this a metallic fuel element?

Mr. HAMILTON. Yes. However, I point out that its operating temperature is much lower than power reactors and the metal versus oxide problem is therefore not pertinent here.

Chairman DURHAM. How far along is that project at the present time?

Mr. HAMILTON. It is about 40 percent complete on construction and about 80 percent complete on design work.

Chairman DURHAM. When did you actually start?

Mr. HAMILTON. We began our design survey in May 1956 and we delivered the last detailed blueprints for the nuclear portion of the plant the latter part of June of this year.

Chairman DURHAM. It is now under construction?

Mr. HAMILTON. It is now under construction.

Chairman DURHAM. They started last year?

Mr. HAMILTON. They broke ground last fall.

As you can see, NDA has a relaxed attitude about these close cooperative projects. We do not fear the loss of engineering position or know-how. It is our view that we have nothing to hide in these exchanges. We do not base future sales on husbanding existing know-how, but rather on continuing to develop new and better ways of doing things.

I have taken the time to go into our philosophy of cooperation to assure you that we recognize the implications of the Euratom agreement for cooperation and are ready to participate fully, either in the informal manner just described, or on an agreed government-to-government basis.

In summary I would recommend that—

1. The international agreement and agreement for cooperation between the United States and Euratom be approved as submitted.

2. Clarification of intent be sought by means of letters of exchange, or otherwise to permit (*a*) inclusion of 2 heavy water reactors as part of the total construction program; (*b*) extension of realistic completion schedules for the full 1 million kilowatt-electrons to 1965; (*c*) phasing reactor selection over a period of the next 2 or 3 years; (*d*) special, but generally equivalent, assistance to heavy water reactors.

Chairman DURHAM. Thank you very much, Mr. Hamilton. Your background and experience and contribution you have already made to the reactor program here in Congress is well known. Your contribution still continues to grow, I can see from your statement.

Mr. HAMILTON. Thank you, sir.

Chairman DURHAM. In your summary, you recommend—

the international agreement and agreement for cooperation between the United States and Euratom be approved as submitted.

From the beginning of your statement, I take it that you do not agree with this idea of adopting proven types of reactors. In other words, you desire to leave it flexible.

I agree with you. Having had the experience we have had here in Congress in the development of this entire program, I think it would be almost a tragedy at the present time to limit this to reactors of a proven type because I think we all realize that development is still in the research stage to a certain degree.

In our own program we recognize that fact, otherwise we would not be building all these research reactors this year which we have already appropriated money for.

Mr. Holifield, do you have any questions.

Representative HOLIFIELD. I have a lot of questions, but I know we are moving along toward the adjournment time of the committee. I am going to restrain myself. I am going to say in general I think you have a very fine statement, Mr. Hamilton. I certainly agree with you on two points you have brought out.

The extension of the goal from 1963 to 1965 seems to be a very good suggestion, not that we would not like to see it done by 1963 if it were possible, but I think if we are going to get your suggestion on C, "phasing reactor selection over a period of the next 2 or 3 years," if we are going to get the benefit out of this, we have to forget about the million kilowatts by 1963 and we have to think of the technological viewpoint.

I am not saying this to delay the program. Psychologically we say we want a million kilowatts by 1963, and this has a great appeal, both in Europe and over here. But the second thing is that by 1963, or 1964 or 1966, what we want is the several hundred million dollars we are putting into this program to bring out the best progressive technology that we can in that time.

This is the important thing, because the million kilowatts will not solve the Middle East oil problem. It has to be considered in relation to some 60 million, I think it is they have over there at this time.

Chairman DURHAM. The objective in this thing we must not forget. It is the fact that we are striving for economic power production as well as the number of kilowatts.

I think your statement bears out the fact that your whole objective, your whole thinking, is in those terms.

Representative HOLIFIELD. There is certain language in the agreement right now:

> To bring into operation by 1963 within the atomic energy community large-scale powerplants using reactors of proven types.

You see, this agreement for cooperation is, in my opinion, so rigidly written that its interpretation, unless changed by United States statute, will compel our negotiators to exchange these letters of clarification, which you suggest could be exchanged; that once we pass this statute in the bill which is before us, unless our negotiators proceed along some of the lines which some of us think they should proceed, which you have suggested, then we are helpless once the Congress does that.

The terms then of the agreement for cooperation come into being. Now, the interpretation of that might be affected by statute and this is our opportunity to affect it by statute. Now I am not sure we are quite ready to write it in and the shortness of time precludes us, in my opinion, doing the type of careful job that we ought to do.

I notice you say go ahead and approve the international agreement for cooperation. We also have to approve the legislation which lies before us. There we find ourselves in a position where, in my opinion, we are not quite in a position to do a good job on the legislation.

Mr. HAMILTON. Mr. Holifield, I think I could not say you should approve them in the form they are before you now were I not very familiar with the powerful tools available to you through forms of floor debate and committee report and the opportunity you will have in subsequent appropriations discussions that may bear on this. Legislative history I know is a powerful tool.

Representative HOLIFIELD. I know it is in domestic affairs, Mr. Hamilton, but I am afraid we are faced with the overriding prestige of the treaty here and there agreements for cooperation are similar to a treaty, which in my opinion, unless modified by their presentation in subsequent bilateral agreements, would take precedent over any floor discussion or even the report.

I think it has to be writen into the statute or we will forfeit any future chances to do anything about it.

Mr. HAMILTON. I think you are right because I think all of us recognize that once it is agreed to, it is binding and becomes the law of the land.

Chairman DURHAM. Mr. Van Zandt.

Representative VAN ZANDT. No questions.

Chairman DURHAM. Mr. Price.

Representative PRICE. No questions.

Chairman DURHAM. Mr. Hosmer.

Representative HOSMER. No questions.

Chairman DURHAM. Thank you very much, Mr. Hamilton, for an excellent statement this morning.

Now the next witness is Mr. Goodman. We are glad to have you before us this morning, Mr. Goodman. Will you proceed with your statement?

STATEMENT OF LEO GOODMAN, ATOMIC ENERGY ADVISER, UNITED AUTO WORKERS

Mr. GOODMAN. Thank you very much, Mr. Chairman.

I feel that in a sense I am here to repeat some of the testimony which I gave when I appeared before you on March 4. I will not repeat it, but I would like to make reference to it and to the positions that we took at that time on the need for accelerating peaceful uses of atomic energy.

Since appearing before you last on March 4, 1958, I have had the privilege of attending a second conference on peaceful uses of the atom called by the International Confederation of Free Trade Unions in Geneva, Switzerland, and to discuss atomic energy developments with the trade union leaders of seven European countries. In all of these meetings, one concept came up again and again—that was that:

> The Euratom program will provide a sound basis for nuclear development in Europe and ease the total dependence on oil from the Middle East.

In my opinion it has an even greater value, because it will prove to the world that a bloc of western nations, including the United States, is taking practical steps to increase the peaceful application of atomic energy and that we do not spend our total effort in making destructive bombs and spreading them around the world.

I stress this point at this time, Mr. Chairman, because in the exhibit of the Soviet Union in Brussels, they are distributing a pamphlet which I would like to give a copy of to the committee on the peaceful uses of the atom. I notice that Maj. Gen. Julius Klein (retired), who appeared here, had the same experience in his recent visit to Europe.

In this booklet, which is being given to millions of visitors to the Brussels Fair, the Soviet Union is putting their total propaganda emphasis on their work on the peaceful uses of the nuclear sciences.

Support for this program can be a major forward step in Senator Anderson's proposal that "we must use the atom to wage the peace which will make war unnecessary."

Another advantage of the proposal at this time is that it will provide jobs and employment to industry and workers both here and in Europe. The nuclear industry here in the United States has begun to lag. It is interesting that one trade journal reported this proposal with the headline "Euratom Agreement Is U. S. Industry's Hope for Sales."

We in the UAW have consistently supported expansion of peaceful uses of atomic energy and acceleration of the nuclear power program, both in the United States and abroad. The AFL–CIO at its last convention voted a resolution which reads in part:

> The United States should provide effective leadership and aid in international activities to promote peaceful use of the atom. This should include: (*a*) full support of efforts of the new International Atomic Energy Agency to aid and share atomic progress for the benefit of the peoples of the world; (*b*) encouragement and assistance to appropriate regional organizations such as

Euratom which make it possible for a number of countries in a particular region to pool resources to develop a common program in the general benefit; and (c) direct United States aid to individual countries.

The European Regional Organization of the ICFTU has endorsed the Euratom program. Walter Schevenels, General Secretary of ERO, at a trade union conference at Chalkis, Greece, speaking on "Atomic Energy in the European Economy," said:

Atomic energy is the only salvation for Europe's shortage of energy and the only chance to produce it, within a reasonable future at a cost level comparable with that of the United States and the U. S. S. R.

He continued:

As already said, no European country, however large, whether France, Great Britain, or Germany, can follow the required pace of development of atomic energy utilization. The resources of none of these countries are large enough to carry out the necessary research work and the building of the infrastructure which is indispensable; treatment of raw materials, enriching of uranium and thorium (by gas diffusion) building of experimental reactors and treatment of irradiated fuels. Therefore, closest cooperation of all European countries and even assistance from the United States of America in the early stages, for the building up of the atomic industry is imperatively necessary. This is only possible through closer political association.

I would like to break into my statement at this time and give the committee for its records a copy of the proceedings of the conference held by the ERO–ICFTU in Europe in 1957 on the subject of atomic energy in Europe in which a combined conference of all the union representatives considered these problems and ended up with the endorsement of the Euratom program which I mentioned.

Chairman DURHAM. Without objection, it may be incorporated in the record along with the other document.

(The publications referred to have been filed with the Joint Committee.)

Mr. GOODMAN. Louis Armand in an article in Foreign Affairs, July 1956, pointed out the political advantages of the Euratom proposal. He wrote:

From the technical point of view, no form of integration is less controversial than integration in the field of nuclear energy.

None is less likely to conflict with established positions. The aim is to set up new installations, whether within the framework of the new community or of the national economies, though always on the understanding that the installations in each country shall be coordinated with those of the others.

In none is the objection to intergovernmental control less valid. Such control is necessitated in this case by the very nature of the nucelar industry.

Finally, the setting up of Euratom will create structures and machinery which may well encourage further economic integration. Thus the functioning of a real joint market in a new field, where it will have the greatest possibilities of success, will favor the development of a joint market in general. In addition, the scope of the joint financial enterprise involved will serve as an example for other investments on a scale in keeping with our times; the same can be said of the laboratories and the research center which Euratom is already planning and which may turn out to be the first of many international universities. Thus we have the right to hope that Euratom, with its various activities and the far-reaching consequences they may have, is in the vanguard of European economic unity.

The only opposition to this program comes from the coal industry. They have misread the facts about the impact of atomic energy on the coal industry.

The largest single consumer of TVA power is the AEC. In recent years the growth of AEC in the TVA area has resulted in the in-

creased consumption of coal by TVA as follows: 1950, 750,000 tons of coal; 1957, 19,500,000 tons of coal; or approximately an increase of 25 times.

In March I pointed out that—

> Those representatives of the coal-producing areas who voted against the bill to accelerate the civilian power reactor program merely lent temporary aid and comfort to those overseas who would like to see the United States application of the peaceful atom lag behind.

In an atomic system based on enriched fuel, one of the prime beneficiaries is the coal industry, both workers and management. It would be a tragedy if in blind opposition to nuclear development, the coal industry were to make European industry increasingly dependent on Mideast oil.

We in organized labor are proud that many informed groups and organizations have reached the same position that we have on this issue. The National Planning Association's summary of findings of their study on productive uses of nuclear energy states:

> The United States encourage and provide technical support to the establishment and effective operation of Euratom. This new development, it is important to recognize, will strengthen the cohesion of Western Europe and perhaps will also be a step toward greater cooperation outside Europe.

The final report of the 12th American Assembly Arden House Conference on Atoms for Power; United States Policy in Atomic Energy Development, says:

> While it can be expected that highly industrialized countries such as those in Europe will ultimately establish their own facilities for building their atomic powerplants, Euratom can provide American industry with experience as well as a market for its products and technology. Such an effort would assist the aims of American foreign policy in developing the economic strength of, and American ties with, the western European community, and would assist in the establishment of an integrated Western Europe. It would provide experience in the operation of large-scale reactors of great and immediate benefit to our own development program.

The Twentieth Century Fund says, "Success of Euratom vital to United States interest."

We urge the committee to report favorably the necessary implementing legislation.

Chairman DURHAM. Thank you very much, Mr. Goodman, for an excellent statement. We are glad to have it.

Are there any questions, Mr. Holifield?

Representative HOLIFIELD. I have no questions. Of course, in approving this Euratom, you would not advocate that the committee accept the package without scrutiny of some of the very important points that have been brought out in the testimony and attempt to cover those points?

Mr. GOODMAN. Not at all. I would expect that the committee would pin down the precise details of this agreement, as they have normally done in their careful work in the past in the domestic programs as well.

Representative HOLIFIELD. You realize this could well be the front for creating favoritism, discrimination, and monopoly interest and disadvantageous patent equities and so forth, do you not?

Mr. GOODMAN. I know that the committee will do its best to prevent any such discrimination.

Representative HOLIFIELD. I have no further questions.

Chairman DURHAM. Mr. Van Zandt.

Representative VAN ZANDT. Mr. Goodman, representing, as I do, a congressional district which has a basic economy of coal, I am amazed at your statement which appears on page 4, when you say:

> The only opposition to this program comes from the coal industry. They have misread the facts about the impact of atomic energy on the coal industry.

Then you continue and say that:

> Those representatives of the coal-producing area who voted against the bill to accelerate the civilian power-reactor program lent temporary aid and comfort to those overseas who would like to see the United States application of the peaceful atoms lag behind.

I was one who voted against the civilian power-reactor program, and I shall continue to do so as long as I represent a coal area in the Congress.

But let me ask you this question: The United Mine Workers, through their president, John Lewis, in cooperation with several coal-hauling railroads of this country, formed a corporation. That corporation, I think, has leased ships, and those ships today are transporting coal to the European market.

Are you of the opinion that we should finance the construction of reactors to produce power in Europe which would furnish energy, thus displacing energy which is now produced by coal and destroy the jobs of American coal miners?

Mr. GOODMAN. Mr. Van Zandt, I tried to cover that whole problem in my earlier appearance. If I may read to you briefly from my testimony of March 4, what I said then was:

> It is unfortunate that the proponents of the private utilities have agitated opposition to nuclear development among those engaged in the production of coal. Each source of energy, whether it be fossil fuel, natural gas, hydro, or nuclear, in our opinion, has its place in the development of our industrial economy.

Representative VAN ZANDT. I remember that statement, Mr. Goodman, but in your statement today you literally ridicule those of us who represent the coalfields and oppose the displacement of coal for fuel.

Mr. GOODMAN. Mr. Van Zandt, I would like to say that, in my opinion, there will be an increase in consumption of coal, both domestically and in Europe, and that this program at this time is merely supplemental and will be for a long time into the future. The fact is that the Southern Coal Producers Association is the only group that I have seen that has issued a statement against this program.

Representative VAN ZANDT. You mean the Euratom program?

Mr. GOODMAN. Yes.

Representative VAN ZANDT. That may be so. I doubt whether you can ignore the attitude of the United Mine Workers of America and the National Coal Association. I think that their position will be made known in regard to this program.

It is not my intention to debate this with you. However in my congressional district, we have two distressed areas, and the unemployment in those areas can be traced to the fact that substitute fuels for coal which are coming into this country from Venezula have taken away from us our eastern-seaboard coal markets. In the meantime, we have opened up new markets in Europe.

From what you say here this morning, these newly developed coal markets will be displaced by atomic power, and we who represent the coal fields are wrong in voicing our concern over programs that destroy the markets for American coal and, likewise, the jobs of American coal miners.

Mr. GOODMAN. I have not said that; I have not said that this program will displace the consumption of coal in Europe. What I have said is that this program will help ease the tensions created by sole reliance on Middle East fuel, and that is quite a different basis upon which to support this program.

Representative VAN ZANDT. Thank you. That concludes my questions.

Chairman DURHAM. Mr. Price.

Representative PRICE. No questions.

Chairman DURHAM. Mr. Hosmer.

Representative HOSMER. No questions.

Chairman DURHAM. Thank you very much, Mr. Goodman. The next witness is Mr. Weaver. Mr. Weaver flew all the way from San Francisco last night, I believe, to be here this morning. He landed here at 9 a. m., and he just got here a few minutes ago. Before he begins, I will say he has always given the committee an excellent, realistic statement on the programs before us.

Mr. Weaver is vice president of the Westinghouse Electric Corp., and is well known to the members of the committee. We are glad to have you with us this morning.

Mr. WEAVER. Thank you, Mr. Chairman.

Chairman DURHAM. You may proceed.

STATEMENT OF CHARLES WEAVER, VICE PRESIDENT, ATOMIC ENERGY, WESTINGHOUSE ELECTRIC CO.

Mr. WEAVER. I responded to some specific questions of the committee in a letter which I wrote on July 11. With your permisison, Mr. Chairman, I would like to supplement those comments with a brief prepared statement.

Chairman DURHAM. Without objection, you may do so.

Mr. WEAVER. Mr. Chairman, I was glad to receive your invitation to appear before the committee and discuss the proposed international agreements between the United States and the European Atomic Energy Community—Euratom.

During the past year, there has been much discussion on what our national-policy objectives in atomic-power development should be, and attention has seemed to focus on making atomic power economically competitive abroad in 5 years, and within 10 years in the United States.

I have visualized the 10-year objective in the United States as applying to high-fuel-cost areas, and placing a utility executive in the position where he can examine facts and decide to construct an atomic powerplant with confidence that it can compete with a conventionally fueled unit. Going forward with the proposed Euratom agreements would be a big step toward realizing this objective.

It would be a mistake to look upon the Euratom agreements as being designed primarily to support our domestic atomic industry. The

fact that industry would benefit must be a secondary consideration for, in the long run, no one can really gain from such a program which has not been established with a legitimate national purpose. The agreements are justified by their value, for they would promote European economic integration, and, in unifying Western Europe, strengthen the free world.

A few words suffice on the merits of Euratom as a concept. Western Europe faces an energy deficit, and its dependence on Mideast oil has been highlighted. When we consider that Western Europe has already taken steps toward economic integration with such efforts as the Coal and Steel Community, and consider that energy deficits could tend to disrupt this integration, it is clear that the proposal will not only enlarge, but also preserve, today's level of unity. Undoubtedly, much will be said in these hearings about oil and its role in Western Europe.

I would like to point out that having nuclear reactors in the Euratom countries may not have an immediate and direct effect on the oil requirements of those nations. Most European electric power comes from coal-burning plants. The advent of nuclear power in Western Europe should be considered in terms of its addition to the total block of available energy rather than in its individual segments of nuclear fuel, coal and oil. In the sum total of energy potential, the addition of nuclear energy will be highly significant.

But atomic power is not ready to economically take its place in the European energy picture, in spite of Europe's need, which is much greater than ours, and in spite of the higher cost of conventional power abroad. Our economic assistance, as proposed by the agreements being considered, would appear well justified when we consider not only the advantages of a stronger and more closely integrated Europe but the opportunity to gain for the United States sorely needed operating experience with large nuclear plants of proven design.

I have referred to the technical problems of atomic-power development many times in my discussions with this committee. We have only scratched the surface of the technical work which we must do if we are to make the most of the opportunities which nuclear energy presents.

The Euratom agreement presents a unique opportunity to build on our present knowledge through the design, construction, and operation of improved plants abroad, and, what I consider to be of prime importance, research and development work on the fuel cycle. There is no question in my mind but that the Euratom program can effectively decrease the time to economic power in the United States.

The sums of money mentioned in connection with the proposed agreements should be adequate to provide the Euratom countries with 1 million kilowatts nuclear generating capacity by 1963. Of course, there are variables, such as site conditions, import duties, taxes, and the like, but I believe that the suggested funds are sufficient.

Reactor safety and reliability will, undoubtedly, be a primary consideration in the selection of reactor types under the agreements, since any controversy over reactor safeguards could diminish the good will we hope to assure. We will probably wish to avoid suggestions that we are using Europe as a testing ground for advanced reactor types. These are sound reasons for the provision that only proven reactor types will be supplied under the agreements.

On the other hand, a provision such as this tends to limit the industrial participants, since the pattern of growth in the industry has been one in which individual companies have been primarily associated with one reactor type.

It would be reassuring to the industry if provision were made for later sale under the Euratom proposal of reactor types not currently proven, when they reach a more advanced stage of development.

The proposed agreements do not provide a basis for indemnification against third-party liability. Rather, the memorandum of understanding states that:

> The Euratom Commission will seek to develop and to secure the adoption, by the earliest practicable date, of suitable measures which will provide adequate financial protection against third-party liability.

The success of Euratom depends not so much upon securing airtight provisions, but upon the support and good will of the parties. For one, I am willing to proceed, confident that this problem can be solved.

Since the economics of the atomic fuel cycle are still uncertain, it is understandable that, in the negotiations between Euratom and the United States, guaranties had to be provided in order to assure firm financing.

With respect to these proposed guaranties of fuel performance, the published material is not precise on the exact relationship between the nuclear-core manufacturer, the United States Government, and the participating Euratom member. A naked guaranty of performance on the part of the United States Government could, possibly, lead to inferior quality-control methods unless high standards are demanded by the United States as a party to the contract.

The proposed Euratom agreements with the various memorandums of understanding and appendixes are highly complex instruments. I would hope that, when the agreements are ratified, methods can be found for simplifying the administration of the program. I would then propose that a group of Government and industrial representatives study the procedures toward this end.

In my recent reply to specific questions from the committee, I stated that the highly desirable features of the agreements are the research and development assistance, the loan of capital funds at reasonable interest rates, and the availability of fissionable material at a cost comparable to that charged in the United States.

From the experience of my own company, I cannot stress too much the value of these aids in getting the Euratom program off to a good start. And the start is one which should be made just as soon as possible. There are projects which need this assurance today. There is research and development work which can commence now.

I urge passage of the legislation before the close of this session of Congress.

Mr. Chairman, if I may append to this another bit of information, I think most of the members of the committee know Mr. de Cubas, who is executive vice president of our Westinghouse Electric International Co.

Mr. de Cubas has been in Europe for the past several weeks and knowing that I would be here today, I asked him on Monday if he had any statement which he would like to make from his very recent con-

tacts with the interested parties in Europe. He has advised me as follows:

After numerous discussions, men prominent in European industry and government, am convinced it would be very serious blow to United States prestige if Euratom agreement not approved by Congress before recess. On the other hand, approval this month would do much to restore confidence in United States leadership and counteract growing U. S. S. R. influence.

Chairman DURHAM. Thank you very much, Mr. Weaver, for your statement.

Of course, referring to Mr. de Cubas' statement, I am sure he realizes the difficulty in which we were placed here by the late arrival of this whole program before the committee and the Congress. It is a greatly complicated and difficult program to work out in such a short time. We intend to do the best we can.

Representative HOLIFIELD. Mr. Weaver, in your reference to proven type reactors, do you refer specifically to two types, the PWR and the BWR?

Mr. WEAVER. In this country today, Mr. Holifield, I would say that is our limitation, yes.

Representative HOLIFIELD. You would not include in that the homogeneous type?

Mr. WEAVER. No; I would not.

Representative HOLIFIELD. You are constructing the homogeneous type for the Yankee people?

Mr. WEAVER. No; pressurized water for Yankee.

The homogeneous reactor comes under the Pennsylvania Power & Light proposal, which the committee has recently considered.

Representative HOLIFIELD. Now you say:

It would be reassuring to the industry if provisions were made for later sale under the Euratom proposal of reactor types not currently proven when they reach a more advanced stage of development.

You are not talking about these six that are contemplated now which are going to be started?

Mr. WEAVER. It could or it could not be part of the six. It could be in addition to or it could be part of. My thought was simply that as we proceed, if there are other reactor types which become proven in this country through an adequate experimental program and operation of prototypes, and if we believe we have confidence in their operation abroad without any hazard to that nation or without in any way holding our own technical prestige in jeopardy, then certainly I would say that we should have provision for their consideration.

Representative HOLIFIELD. Of course, this cannot happen if we look upon the start in 1959 and the finish in 1963, the 4-year construction period that is envisaged here. This statement of yours cannot be a realistic statement.

In view of the fact that you have already testified that the two types that are proven in your mind are the PWR and the BWR types and in view of construction schedule, the necessity to start in 1959 and to finish in 1963, if those terms are met under the articles of agreement and the goals that are set, then in effect you are not applying that statement to any of the reactors which could be started under this six-reactor program?

Mr. WEAVER. Mr. Holifield, I believe I suggested that provision be made for later sale. By this I recognize that the only way other types can come under such an arrangement will be through extension of the date.

Now, whether the date would be extended along with the number of kilowatts, in other words, increasing the million kilowatts, I have not considered this.

Representative HOLIFIELD. Does your statement then contemplate a continued Euratom program until they attain the goals of 15 million kilowatts capacity and continued subsidy from the American taxpayer to achieve the 15 million goal?

Mr. WEAVER. This is a matter which must be very carefully examined as we proceed. I have no such recommendation at this time.

Representative HOLIFIELD. You say:

> It would be reassuring to the industry if provisions were made for later sale under the Euratom proposal of reactor types not proven when they reach a more advanced stage of development.

I can only gather from that that you mean in the future after this particular million kilowatt capacity is constructed that we go ahead and assure industry that we are going to continue to subsidize the manufacture in this country and the utility buyer in Europe for succeeding types of reactors which are not under the so-called proven type considered here.

So I would have to take from this sentence of yours that you contemplate a continued Euratom program which would go far beyond the one that we are authorizing now.

Mr. WEAVER. This is not the case, Mr. Holifield. I am merely trying to recognize the fact that there may be types which could come along through prototype experience in this country and be considered sufficiently proven so that we could proceed with construction in order to gain some operating experience, and that such construction abroad might well and properly be a part of this program. I would not visualize that any consideration should be given to anything much later than a year or two extension of this 1963 date. This is the magnitude I am thinking about.

I am only trying to indicate that certainly I am not anxious to see either manufacturers or types limited, but at the same time I am anxious to see that we do a sound technical job.

Representative HOLIFIELD. I notice at the bottom of page 4 you say:

> A naked guaranty of performance on the part of the United States Government could possibly lead to inferior quality control methods unless high standards are demanded by the United States as a party to the contract.

I don't believe you were here when I went into this matter with Mr. Wilson this morning.

Mr. WEAVER. No; I was not here, I am sorry.

Representative HOLIFIELD. I am concerned with this same point, this point of no limit guaranty on fuel elements. When you read the testimony later—I will not repeat it now of course—you will see that I am concerned with this same point you are concerned with.

Mr. WEAVER. Yes. My concern simply stems out of our experience, Mr. Holifield. We have learned the close tolerances and the great amount of quality control effort which we must put into this fuel element.

Chairman DURHAM. Mr. Van Zandt.

Representative VAN ZANDT. No questions.

Chairman DURHAM. Mr. Price.

Representative PRICE. No questions.

Chairman DURHAM. Mr. Hosmer.

Representative HOSMER. I do have a question in line with the last one asked by Mr. Holifield.

As a manufacturer, how do you visualize this business of getting together on the guaranty?

You have maybe a fuel element that you are awfully proud of. The Atomic Energy Commission looks at it and says, "This might not be so hot." The Europe buyer is in between you. Do you feel that the Government should guarantee anything you want to sell?

How in your mind should this thing work?

Mr. WEAVER. This is what I was referring to when I mentioned that the understanding of agreement, as I read it, and the companies' working papers are somewhat complex when it comes down to how do you go about doing the job.

My understanding is that industry would act on a free competitive basis and that it would be an agreement which had been made between a manufacturer or manufacturers with a utility in Europe which would be brought before the group designated by the Atomic Energy Commission and the Euratom interests to evaluate and determine the acceptance of that proposal under the agreement. There are procedures connected with that that do concern me, but I think they can be worked out within the present framework if we sit down and have an understanding.

Representative HOSMER. The United States Government then would be bound by this evaluating group and it would have no veto of its own if it did not like a particular fuel element it was being called on to guarantee?

Mr. WEAVER. Mr. Hosmer, I am not sure how our Government would be limited in that respect, not having been party to the discussions to date.

Representative HOLIFIELD. May I ask one more question?

Chairman DURHAM. Mr. Holifield.

Representative HOLIFIELD. In the event that your company would contract with one of these nations, and I do not want to pin you down to a commitment of course, but in view of this last statement which we read here, in regard to the guaranty of fuel elements, would you be in a position to guarantee the 10,000 megawatt days?

Mr. WEAVER. Mr. Holifield, the extent of our guarantee would be dependent upon the particular plant and the type of fuel that we were proposing. The simple statement of 10,000 megawatt days does not necessarily pertain to some of the considerations which we are giving this problem with some of the interests in Europe.

Representative HOLIFIELD. As far as you are concerned then, this guaranty of fuel elements is not considered to be a vital part of the program?

Mr. WEAVER. This is my opinion. I think it is desirable to have it in. It will be beneficial on the plants that you want to get underway very quickly. I question its applicability to later plants. I would leave it in because I think it can be of possible help.

I have emphasized to the committee the other points of research and developments (it is always the technical problems which are the tough ones) and trying to overcome some of Europe's deficiencies so far as available funds are concerned, and the very distinct problem they have with high use charges for fuel if they pursue the present financing course that they must follow.

Representative HOLIFIELD. We have had some letters, very few of them I admit, where this was not considered important, but on the other hand, from many of the smaller companies I think we have had letters which indicate that this is almost the key to the program, the Government's assumption of liability on the life of these fuel elements.

Mr. WEAVER. I think if we were talking guaranties in exceess of the 10,000, which has been mentioned, this might be more significant in the way of an assist than the 10,000 is itself. I have a feeling that here is an area which it is right we should explore and under certain circumstances, with certain plants and certain fueling schedules, there will be advantages gained through this. There will be other projects where I suspect the utility and the manufacture might just as soon not apply for assistance under this provision.

Representative HOLIFIELD. Do you expect the Atomic Energy Commission, in approving the types of reactors to be built under these contracts to take into consideration the fact that in 1 contract they might have to assume a liability of 20 or 30 percent guaranty of the life of the fuel and in a competing contract they might not have to assume any, the manufacture might take all of the 10,000 megawatt-day guaranty liability?

Mr. WEAVER. Again, Mr. Holifield, my thought would be that before the Atomic Energy Commission or Euratom entered the picture there would be a basic agreement between a supplier and the electric utility involved, so that the responsibility for selection of a proposal would not necessarily rest with the Government groups.

Representative HOLIFIELD. I realize that, but they would be called upon to approve, the AEC would undoubtedly be called upon as a party to the agreement to approve a reactor type?

Mr. WEAVER. That is certainly right.

Representative HOLIFIELD. And in considering the points involved, they might be inclined to rule out the approval of a contract which involved unknown liability for one which involved no liability on the fuel element life?

Mr. WEAVER. Again, Mr. Holifield, my feeling would be that they would be only presented with one proposal. In other words, that the evaluation work that you are thinking of would come in advance of the proposal being submitted by the utility to Euratom for consideration under the program.

Representative HOLIFIELD. You would expect no attempt on the part of the Atomic Energy Commission, then, to influence the approval or disapproval of a reactor type on the basis of the element of liability which the Government would assume on fuel life?

Mr. WEAVER. If the proposal contemplated a considerable liability on the part of our Government under this program, I would certainly expect that that proposal would be given most serious consideration by the Commission and that there would be an adequate investigation of the circumstances.

Representative HOLIFIELD. If they do take into consideration that factor, this would mean, then, that the company with the most experience and the most background and the most "proven" type—I use the word "proven" in quotes—would have an edge over a company that might have a more promising type and be willing to expend its money, and the buyer might be willing to expend his money on the expectation of more economic operation.

My question, then, would be: If the AEC did take this into consideration, it might cause a freezing of this program into either the PWR or the BWR types, would it not?

Mr. WEAVER. I think that we identify that with a consideration of this problem of fuel-cycle guaranties; that these are our proven types that we are faced with at the start of such a program if we are to get it underway quickly.

Representative HOLIFIELD. They are not proven in the sense of being economic, are they?

Mr. WEAVER. This I do not believe was a consideration in defining "proven." We were talking about the operation of the plant. I think an operating plant must be a part of the definition of a proven plant.

The economics will, presumably, be something that will be evaluated by the European utility involved in considering the proposals, and will be a factor in their recommendation of a specific proposal for consideration to Euratom and the Atomic Energy Commission.

Representative HOLIFIELD. That is all, Mr. Chairman.

Chairman DURHAM. This closes our public hearings on the Euratom program, and, without objection, I would like to put into the record a resolution of the European Parliament, and, also, a speech by Mr. Armand on the Euratom program.

(The material referred to follows:)

THE TEXT OF A RESOLUTION ADOPTED UNANIMOUSLY BY THE EUROPEAN PARLIAMENT AT STRASBOURG ON JUNE 23, 1958

The European Parliament

composed of the elected members of the six parliaments representing the six peoples united in the European Community and currently in session in Strasbourg

Having heard the statement of the President of the Euratom Commission citing the agreement concluded between Euratom and the United States, expresses its satisfaction that an agreement having as its aim cooperation in the field of the exclusively pacific use of nuclear energy has been concluded with the United States of America only six months after the setting up of Euratom,

Expresses the wish that this agreement shall permit the member countries of Euratom and the United States to combine their efforts, their experience, their inventive capacities and their resources in order to achieve together a joint program for nuclear power stations and research, establishing between them a broad and trustful association to their mutual benefit,

Requests the President of the European Parliament to bring this resolution immediately to the attention of the United States Congress.

SPEECH OF M. LOUIS ARMAND, PRESIDENT OF THE COMMISSION OF EURATOM, BEFORE THE EUROPEAN PARLIAMENTARY ASSEMBLY, STRASBOURG, JUNE 23, 1958

Mr. President, ladies and gentlemen, in agreement with the Committee of Presidents, our President has kindly agreed that we should give you today a short account of the establishment of the Commission of the European Atomic Energy Community and of the tasks it has already accomplished.

The Euratom Commission is now almost 6 months old. At such an age, months still count, and it has, therefore, acquired a more definite character since the time when my colleague, M. Enrico Medi, Vice President of the Commission, described to you the main features of its work.

To give the Assembly a formal report, it would suffice to take up the treaty, and to try to establish how far we have come in the various fields which are entrusted to the Community. This will be done completely and systematically in the statement which is to be made to you at the next session of the Assembly.

I would, therefore, refer you, for this purpose, to the detailed report which will be sent to you a month in advance of the session.

In order to profit from this opportunity of informing you, the Commission has requested me to describe our work, not so much in relation to the text of the treaty as in relation to the development of atomic energy. For we must have a clear picture of reality, and, before we can judge the significance of the steps which we are taking along the road indicated by the treaty, we must define the domain which we are to explore and in which we are to work. It is this survey which I shoud like to make, very rapidly, today.

Here, in fact, the Commission and the Community have a very broad mission to fulfill. This mission is defined as follows by article I of the Euratom Treaty:

"It shall be the aim of the Community to contribute to the raising of the standard of living in member states and to the development of commercial exchanges with other countries by the creation of conditions necessary for the speedy"—and I should like to emphasize that word "speedy"—"the speedy establishment and growth of nuclear industries."

Every word of this article, which defines the role of our Atomic Energy Commission, face to face with Europe's problems, should be carefully weighed.

The words "nuclear industries," first of all, show that it is essentially an industrial development which we have to help bring about. On the other hand, Euratom also has a social and economic aim—the raising of the standard of living in member states. Finally, the treaty explicitly provides for the development of trade with other countries. The Community must, therefore, be open and outward looking.

The domain of nuclear industry

Let us first try to define the domain of nuclear industry that we have to develop. This is something which is spoken about every day, because it is fashionable, but usually in very vague terms. Not only vague about the scientific aspect of the problem, vague about neutrons or mesons, because it is polite to begin conversations about nuclear energy by saying: "Of course I am not an expert * * *"; but also vague about its economic aspect, where many people are tempted to jump to conclusions. In fact, comparatively little is as yet known about the economic aspect of the nuclear industry. In this field we ought to behave like the pupils of Professor Oppenheimer, who when they came to join his seminar, have to learn to admit in all modesty that there are certain things of which they are ignorant.

But because one knows nothing, one might be tempted to do nothing and simply wait. If that were so, Europe would have to abandon all hope of taking her place in a field which, if today it is full of speculation, is nevertheless full of hope and certainty for the future. I should like to bring home to you this contrast—between the great uncertainty of the present day and the certainty for the future—a certainty shared by everyone throughout the world. Only a few years ago, atomic energy was wholly the affair of research specialists and military men; and those who then prophesied its industrial future can see today that they were right when they see the importance that the great countries of the world attach to the nuclear industry.

In the United Kingdom, Her Majesty the Queen opened Calder Hall. In the United States it was President Eisenhower who pressed the button to start the turbines at Shippingport. These ceremonies symbolize the importance, for a great country, of assuring its nuclear future.

Necessary association

The optimists, then, were right, and they saw to it that Europe was given an industrial atomic Community. To the word "industrial," the word "peaceful" should be added. These, indeed, give the two essential characteristics of Euratom. Of all the many international atomic organizations existing today, Euratom is the only one which has both these characteristics at the same time.

Let us see what this implies for the peaceful development of atomic energy. It certainly imposes on us the most difficult task in the whole atomic energy

field. Cooperative efforts for the "scientific" development of atomic energy do not encounter particular difficulties: it is simply a question of setting up large-scale laboratories and the appropriate equipment.

The "military" development of atomic energy is also relatively simple, for two very different reasons. The first is, in a sense, a philosophic reason: that is, it is always easier to develop energy for destruction than for creative use. It was easier to use fire for burning the crops than for cooking, because for the latter it was necessary to invent cooking utensils. The same is true of atomic energy; it is much easier to produce military energy than peaceful energy. Thus, only uranium can be used today for making bombs and for operating generators to produce peaceful power; whereas plutonium, and energy produced by the fusion of light atoms, can, as yet, be used only for purely destructive purposes. This is certainly an important problem for those who seek to develop the peaceful uses of atomic energy.

The second difficulty results from the fact that in military affairs, questions of cost play only a minor role. The essential aim is technical success. On the other hand, the peaceful development of atomic energy can only take place in the light of economic necessities, and it can only contribute to the raising of the standard of living of which I spoke just now, if its cost is reasonable.

It is the difficulty of this task that makes necessary our efforts at cooperation and association.

I said just now that we were living in a period of the greatest uncertainty. I do not mean only the dreams which journalists built up around Zeta [1] and around the hopes, now more or less dashed, which it aroused. As a matter of fact, the industrialists and technicians concerned with the transformation into kilowatt hours of the natural uranium extracted from the earth are faced with very diverse methods and possibilities. The exploration of these various methods and possibilities poses such technological problems that the effort involved looks rather intimidating. Those who have to choose must therefore act with the greatest prudence, for every experiment is costly: it may amount to some $50 million. It also involves a whole series of ancillary industries whose work might be wasted if finally some other method had to be chosen.

It might be thought sufficient to bring a number of experts round a table in order to choose the best solution; but this is not so. Experts cannot choose the best method until the technicians have built and operated the actual apparatus which will permit them to work out the cost price. What will therefore be decisive as between the various methods in question is the technological progress and experience achieved.

This shows the importance of what is being done now, not on the experimental, but on the industrial scale.

And that, gentlemen, is why Euratom came at the right moment. The six countries are joining together at a time when industry is, so to speak, joining battle to determine which of all these various methods will give us competitive cost prices.

The need to catch up

We saw just now that Euratom is required to work for the speedy establishment of nuclear industries. Why is the matter so urgent? Not only because it is right always to push ahead as fast as possible, but also because Western Europe, as you know, is herself forced forward by her evergrowing energy deficit. For all of our 6 countries in 1957, energy imports cost $2,000 million. In another decade, they will cost $4,000 million. Our energy deficit is therefore an urgent matter. Moreover, we are lagging behind in nuclear affairs. In mathematical terms, the momentum of the forces which ought to drive us to develop atomic energy is the product of our deficit and our timelag: and the latter is especially large in comparison with the other great world powers. It is certainly the Europe of the six which will now have to devote the most capital to the development of atomic energy, because it is now that its economic future hangs in the balance. Euratom has thus an essential and necessary role to play as a catalyst and accelerator of the efforts required. This is not the desire of a technician: it is the fear of an economist.

How do other countries stand in this respect? Let me briefly sketch the situation.

Russia, which is very rich in conventional power, in coal and oil, has nevertheless planned a vast program for the development of atomic energy. This is not only a production program, but a program of research in various directions.

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[1] Britain's code word for the controlled fusion experiment.

Research is in progress on some 10 types of reactors, and a capacity of 2 to 2½ million kilowatts is forecast for 1960.

I am speaking of millions of kilowatts of installed capacity: For those who prefer to calculate in tons of coal, it is only necessary to multiply by three to obtain the number of million tons of coal annually saved by means of such nuclear electricity capacity.

The United States atomic program is that of a nation rich in energy and above all in cheap conventional energy. Nevertheless, by 1960, there will be an installed capacity of 600,000 kilowatts, quite apart from all the equipment designed for powering submarines, which is a magnificent technological achievement from which power production will benefit. But the United States has not undertaken a program for the large-scale production of atomic energy. The latter is considerably more expensive there than conventional energy, which is by no means lacking since the United States in fact exports coal.

Only Great Britain has embarked on large-scale nuclear energy production based on a single type of reactor, which has shown itself to be an incontestable technological success. Its target is for 6 million kilowatts by 1965; even if it takes slightly longer to reach this target, there will still be some 1.5 million kilowatts installed by 1962, corresponding to 4 large nuclear power stations of some 300 to 500 megawatts each, apart from Calder Hall.

If the 6 countries were to have made a comparable effort, their energy situation would have required the installation of 15 million kilowatts within a decade. That, indeed, was the target for Euratom set by Herr Etzel, Signor Giordani, and myself, last year, in response to the question our Governments charged us to answer.

Euratom's action will enable the six countries to achieve a program which meets their economic needs more effectively than have the ordinary national projects embarked upon hitherto.

In England, the undertaking of a large-scale program has been facilitated by the fact that large-scale power stations have been directly financed by the authorities responsible for developing electric power production. In many of our countries, on the other hand, it is private industry which has to finance the power stations, and it is only interested in doing so if cost prices are low enough. This, then, is one of the difficulties which I mentioned just now; that is, the importance of cost prices.

It should be added that basic atomic science is less highly developed in the six countries than in Russia, in England, or in the United States; for in these other countries considerable sums have been spent on military programs.

The amount spent on atomic affairs in the United States since 1940 is in the region of 15 to 20 billion dollars; in Great Britain, more than a billion dollars; and in Europe only about $500 million, most of it in France. Fortunately, these figures do not measure the timelag in the development of peaceful atomic power, for part of the expenses in question have been devoted to military ends. Nevertheless, the general training of technicians and the equipment of certain branches of industry are closely related to the sums already spent. Each of the six countries must therefore make a considerable effort.

Let us make no mistake: Europe will not make up her timelag in the energy and atomic fields simply by virtue of having signed a treaty in Rome. There is no built-in miracle in the treaty setting up the Euratom Commission. The timelag can only be made up if each of the six countries decides to make a greater effort. It is necessary both to fill the gaps in our technical knowledge and to establish a program to put into practice the discoveries of which our scientists will certainly be capable if we give them the tools, but which they will not be able to bring to fruition if the tools are not there.

The Commission has the duty of seeing that the funds devoted to the development of atomic energy by the various Community countries are used in full awareness of the facts. Euratom has to see to it that development is coordinated; it will avoid reduplication, and it will create a friendly rivalry without arousing wasteful competition.

The means for this are supplied by the treaty, but—I repeat—nothing can be done without the financial efforts which will have to be made by each of our six countries in the years to come. However great may be Euratom's ability to insure the best use of men and capital, if a minimum of investment in atomic matters is not effected in the next few years, our countries will still lag behind the great powers, which nevertheless need this new source of energy less urgently than we do.

The solution of our problem does not lie simply in the creation of large industrial complexes or large atomic research centers, atomic energy in fact demands

a very large range of equipment, stretching from uranium mines to electronics. It is necessary to set up an industry capable of producing fuel elements as well as reactors and kilowatt-hours.

A fortunate consequence: stimulus to industry

It must no be forgotten that the necessary adaptation has a double aspect. If all that we could do were to buy reactors and make them work, we should be in the position of underdeveloped countries. On the other hand, if we can build reactors, we shall not only be able to export them, but we should also be able—and I insist upon this because it is seldom stressed—we should also be able to renovate our industries as a whole.

Indeed, all the industries which help in the development of atomic energy are already looking to the future, for this very reason. This is the case, for instance, with the very highly developed metallurgical industry needed for nuclear energy: progress here will give good service in many other fields. There is also the example of electronics and telecommunications. As a result, making atomic energy means renovating industry.

This is worth pondering: the impulse which Euratom must give will serve as a catalyst to speed the modernization of our countries. In other words, to produce atomic energy will not only put our countries in a position to solve their energy problem: it will also give our industries the chance of thinking afresh.

When one compares this role of Euratom's with that of the other two European Communities, one cannot avoid being struck by the difference of scale between them. The problems of the atomic Community are in fact very limited, and even within the next 10 years will only represent a small part of the whole economy. There is in fact no common measure between the extent of problems facing the Coal and Steel Community and the European Economic Community on the one hand and those facing Euratom on the other.

Nevertheless, Euratom may serve more rapidly to bring about a community spirit and thus to accelerate our thinking afresh.

The first months of Euratom

Ours will therefore be an advance-guard community. Let me now give you a rapid summary of what its tasks will be.

So far it has very little staff. I don't think there are as many as 150 people working for it at the Rue Belliard in Brussels.

It is determined to work in common with the other Communities on all the problems which it shares with them. Professor Hallstein will shortly make to you a declaration on the subject of common services, on which the Euratom Commission is fully in agreement.

We shall have to handle expenses which will be greater than those of our administration itself. We have, in fact, to set up a common study center and to develop a research program, for both of which the treaty provides a sum of $215 million. This figure is large by comparison with the administrative budget of a Community: but on the atomic scale it is small. This sum of $215 million for 5 years is roughly as much as the United Kingdom spends in this field in a single year.

As a result, if Europeans think that they can relax merely because they have decided to set up a common study center, they are gravely mistaken. This center can only be complementary to the effort which everyone must make for himself.

In order to set up this common research center, we need the support and advice of the widest possible range of experts. This will be given us on the European scale, by our Scientific and Technical Committee, which is already in being. Beginning on the 7th of July next, it will be consulted on the first research projects to be undertaken by the Community.

Naturally, we shall include in this research some work on fusion. I said earlier that the first hopes of achieving fusion on the experimental scale had been disappointed. It is therefore necessary to start, in all modesty, from the beginning; and in this field, Europe has just as much chance as the others. We are going to try to start off on the right foot by bringing together all the necessary experts. But the hopes raised by fusion must not act as a "tranquilizer," as one scientist put it, which lulls us into doing nothing in the field of uranium. The atomic power that we urgently need will have to come from uranium.

In order to collaborate in the field of fusion, on the widest European scale, we have made contact with CERN[2] in Geneva, and this very week we are to examine the conditions of our collaboration on this subject. That, I think, is an index of our will to cooperate with other international bodies. In the same spirit, we have already had numerous contacts with the Nuclear Agency of OEEC.

Within a year we should be able to give the Council of Ministers precise details of our research program and clear indications of the lines we intend to pursue.

Apart from research, we have to undertake a whole series of other activities resulting from application of the treaty. All have been begun—and even finished—within the time limits laid down. Alongside the research center, we have to organize a personnel training center.

More than this, the Treaty requires us to present, within a year, proposals for a European university. In our view, this problem is too important not to be considered jointly by the three Communities. The first meetings between their representaives have already taken place. The preparation of a European university is one example of the catalyzing role of Euratom in the most varied fields.

We are further required to set up a nuclear common market. This will really be the advance guard of the industrial common market, following that of the Coal and Steel Community; since from the first of January 1959 onwards it will bring about the free circulation of a certain number of nuclear materials and goods.

To go beyond this first step, negotiations between the six countries are provided for by article 94b of the Euratom Treaty. The necessary measures have been taken in order to present, within the required time limits, practical proposals to this end.

As a further essential of the nuclear common market, a supply agency has to be set up. The Commission was given a time limit of 3 months to propose the statute of the Agency to the Council of Ministers. This has been done, and it will be discussed at the meeting of the Council of Ministers on July 1.

Safety regulations likewise had to be proposed to the Council of Ministers within 6 months; this too has been done.

The problems of health protection are at present under study. Experts have been appointed, and are working to establish the basic rules which will be common to our six countries. Naturally, this work will be carried out in liaison with OEEC and with the IAEA in Vienna.

Another of our tasks is to draw up an inventory of all the industries contributing to nuclear energy. This inventory, in accordance with article 213 of the treaty, must be submitted to the Assembly within 6 months of the Commission's taking up its duties. Within 10 days from now, this inventory will be laid before the bureau of the Assembly, and my colleague M. Paul de Groote will have the opportunity to discuss it with you and to describe the conclusions to be drawn from it.

Energy policy and relations with the United States and the United Kingdom

After this survey of the different tasks entrusted to us by the treaty, I should like to say a few words about the power program. In this vital domain we have to define our policy in concert with the other Communities. We have therefore set up a liaison body with the European Coal and Steel Community and with the European Economic Community.

In fact, in this period of rapid evolution, we must have sufficiently detailed knowledge of the economic factors affecting costs. That is why we have to have a first-rate economic service.

In the effort to make up our timelag, we shall not be alone. Great Britain has appointed Sir William Meiklereid as its diplomatic representative to the European Atomic Energy Community, and last week Euratom representatives had preliminary talks with the British authorities. We hope that these talks will quickly lead to concrete results and to a closer and closer collaboration between Euratom and the United Kingdom.

With the United States, already represented vis-a-vis the Community by Ambassador Butterworth, we held preparatory discussions even before the conclusion of the reaty, at the time of the mission of the "Three Wise Men." For this reason we have been able very quickly to establish close relations with the United States to the mutual advantage of the latter and of our six countries.

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[2] Organization for European Nuclear Research.

My colleagues Messrs. Krekeler and Sassen, who have been especially charged to conduct the negotiations, will have the opportunity of discussing this subject with you at greater length when the negotiations are finally and definitely concluded.

What are the bases of this cooperation? They may be found in the survey which I have just made of the degree of progress in atomic energy in the various countries. The United States does not immediately need atomic energy, since it has abundant and cheap conventional energy. It has no incentive at present to embark on an industrial energy production program, and in fact they have at present only an experimental program. In this case, why not set up in Europe a large complex of industrial nuclear-power stations, making use of the experience already acquired in the United States? That is how there arose the idea of a joint United States-Euratom program for reactors of an electric power of 1 million kilowatts.

American participation in the execution of the program is as follows:

First, supplying the fuel. Thus, thanks to this joint program, we shall be able to try out enriched uranium reactors. For us, this is a new departure. The British operations, like the French, are so far only with natural uranium.

Secondly, financial aid. The total cost, corresponding to the installation of 1 million kilowatts, will be in the region of $350 million. The United States would grant a loan of $135 million to encourage atomic investments, which for the moment are most costly than investments in the same capacity of conventional power.

Furthermore, there is one characteristic of the agreement that is novel and fundamental: Technological research on these reactors will be carried out jointly. Remember that even as little as a year ago, countries which could not build reactors could buy they from more advanced nations, but were, so to speak, forbidden to look at how the reactors were made. The United States Government has decided to devote to this research $50 million for the first 5 years; Euratom will contribute the same sum. We have already seen how important this technological research is, since it determines any lowering of cost prices.

Finally, the United States has agreed to buy back the plutonium produced by these reactors and not to use it for military purposes. This is even more important, since because Euratom's aims are exclusively peaceful it would have been almost impossible for it to undertake such a program by itself, owing to its inability, for the moment at least, to find a use for the plutonium. This then is an action of the greatest political importance, a demonstration of confidence which will enable us to start off on a large scale.

There remains the important question of the inspection and control of fissile materials. In agreements hitherto reached with other countries, the United States made a point of retaining the right to inspect and control the establishment of the reactor projects and the use of the fissile materials they supplied. In our agreement, the United States has consented to recognize inspection and control by Euratom.

Since the governments of the six countries have delegated to Euratom the ownership of fissile material, the Community has been able to secure recognition of its own inspection and control. Is that not a striking example of the Community's value? We regard this acceptance as something much more important than a satisfaction of prestige: We regard it as the germ of a world inspection and control of atomic energy. Our young Community, endowed quite simply with the confidence of our governments, is in process of establishing inspection and control of a new type, and one which could serve as an example to all nations.

The agreement with the United States therefore embodies great hopes, ranging from technical subjects to high politics. As it happens, it has been signed just today by President Eisenhower; and if I have been somewhat leisurely in the course of my statement today, it was in order to wait for the precise moment when I could publicly announce it. [Applause.]

I should like to conclude this statement by saying that the Euratom Commission has sought to give the members of parliament of our six countries the completest possible information on our problems, without trying to conceal their difficulty. It has sought also to bring before you all the hopes which its work arouses and, in particular, those which may be realized in a few weeks' time, now that the agreement with the United States lies before Congress. [Applause.]

Chairman DURHAM. I will announce also that I am scheduling an executive session of the full committee, Joint Committee, tomorrow afternoon at 2 o'clock to consider the Euratom program.

Following this, we will probably want to talk to the Atomic Energy Commission and also to the State Department.

Thank you very much, Mr. Weaver, for coming to us.

Before we close, I will insert in the record, two statements received by the committee regarding the Euratom program.

(The statements referred to are as follows:)

STATEMENT OF ANDREW J. BIEMILLER, DIRECTOR OF LEGISLATION, AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS, ON UNITED STATES AND EURATOM AGREEMENT, JULY 25, 1958

The American Federation of Labor and Congress of Industrial Organizations has long held that the development of electrical power from atomic energy, at a cost competitive with other fuels, is essential to the economic well-being of this Nation and to the security of its position in the cold war.

To these objectives we might well add the economic stability and independence of Western Europe.

American labor for years has advocated American economic and technical aid for specific projects which will help to further European integration. Euratom, composed as it is of six European industrial nations representing the bulk of Western Europe's population, is one such specific project which merits our full cooperation.

We are hopeful that the establishment of Euratom, of the Coal and Steel Community, and of the Common Market will be precursors of other European authorities in important economic areas.

The AFL–CIO wholeheartedly supports the approval by Congress of the proposed agreement to cooperate with Euratom in the construction of 6 reactors for the production of power and of the $135 million loan to support this project.

There are several aspects to these proposals which merit particular attention.

Perhaps the first of these is the benefit which will accrue to the West in helping to solve the technical problems necessary to reduce the costs of producing electrical energy from atomic energy.

In this connection we might express some reservation about the language of the agreement which provides that only "proven" United States reactors will be duplicated in the Euratom countries. Depending on the interpretation put upon this language by our own Atomic Energy Commission, the use of "proven" reactors may result in unnecessarily rigid standards.

For example, the AEC was authorized by Congress last year to construct a plutonium recycling reactor. This year the construction of a natural uranium gas-cooled reactor has been authorized. In addition, five design studies were authorized by the fiscal 1959 legislation.

If the construction of the Euratom reactors is to be limited to a duplication of United States reactors which are producing electric power today, then we must assume that the Euratom nations may be burdened with physical facilities which might be doomed to obsolescence even while they are under construction.

Consequently, we would urge that this committee exert every effort to insure construction from only the most advanced and economical designs available.

Secondly, we must consider the benefits which power reactors will bring to the European economy.

Since 1948, it has been the policy of the United States to provide economic and technical aid to stabilize the economy of Europe. During this period, billions of American dollars voted by the Congress of the United States have substantially achieved this end.

However, recent events have emphasized that that stability is threatened by highly unstable political conditions in the Middle East, the chief source of Europe's oil imports. Europe is a fuel-importing area, and depends heavily on Middle Eastern oil to meet these needs.

Initially, the Euratom agreement will do little to alleviate this dependence. The addition of 1 million kilowatts to the electric-production capacity of Euratom nations in the next 5 years undoubtedly will not even meet normal growth demands. However, we believe it is essential that a substantial beginning be made in this direction as soon as possible.

Thirdly, we must recognize that the Soviet Union is determined that it will not fall behind in the race to produce electricity abundantly and cheaply from atomic reactors. We know that several full-scale reactors are already in existence and operating within Soviet borders.

Much of the West's success is the cold war depends on its ability to keep up with Soviet industrial competition. In this, Western Europe is and must continue to be a strong industrial partner of the United States.

One of the key prerequisites to industrial achievement is the availability of low-cost power. We must help Europe to provide for itself the cheap industrial fuel of the future—atomic power.

We in the United States have the skills and technology to make a substantial contribution to the West's ability to advance rapidly in the atomic power field. We can do this best by cooperating with the friendly Euratom nations whose need for this power is immediate. We should do it now.

STATEMENT OF THE WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM ON PROPOSED EURATOM AGREEMENTS TO THE JOINT COMMITTEE ON ATOMIC ENERGY

The United States section of the Women's International League for Peace and Freedom expresses the hope that your committee will favorably recommend and press actively for the approval by the Senate of the proposed Euratom agreements before Congress adjourns next month.

As Senator Styles Bridges said recently, we believe that these agreements would open the way to the use of nuclear power by Western Europe, and thus help our friends and allies to meet their increasing demands for peaceful energy. Because of the depletion or limitation of some of the natural sources of industrial power in the past, Europe is harder pressed than the United States to find new sources and she needs them sooner.

A joint program, such as this, which is meant to make operable about 1 million electric kilowatts of installed nuclear capacity in the 6-nation European Atomic Energy Community by 1963, will go far toward industrial and economic development which will not only raise standards of living, facilitate international trade, cultivate the habit of mutual aid and economic coordination but will undergird the political aspirations of a united Europe.

As Senator John O. Pastore so wisely pointed out, the crisis in the Middle East has focused attention on the need for alternative sources of energy to meet mounting power requirements. Once Europe is no longer dependent on oil, it can deal in the commercial market without fear, thus lessening tensions between buyer and seller. When oil is no longer a potential political weapon, there will be no alleged need for armies of occupation, and young states should solve their own internal problems without mutual fears. It is just possible that the stability of the Middle East, the stability of Europe, and the peace of the world may depend on a nuclear substitute for oil.

If the approval of these agreements can be the instrument to strengthen Western Europe, it will do much to counteract any loss of economic advantage by withdrawal of troops and bases from the Middle East. Approval of these agreements will be affirmative action to insure that Western Europe will not be left powerless with unfulfilled energy requirements.

We ask you to remember that "there is a tide in the affairs of men which taken at the flood leads on to fortune." This may be the flood tide to peace and the economic and social welfare not only of Europe but the rest of the world. Let us not balk fortune through postponement.

Chairman DURHAM. The committee is adjourned.

(Thereupon, at 12:20 p. m. Wednesday, July 30, 1958, the committee adjourned.)

APPENDIX

APPENDIX 1

JOINT COMMITTEE LETTER TO REACTOR EXPERTS AND INDUSTRIAL REPRESENTATIVES, ONE DATED JUNE 28, 1958, AND THE OTHER, JUNE 30, 1958

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

DEAR SIR: On June 23, 1958, the President submitted to the Congress a proposed agreement with Euratom for cooperation in nuclear-power development under sections 123 and 124 of the Atomic Energy Act of 1954. The proposed arrangement, together with supporting documents, has been referred to the Joint Committee for consideration.

It would be greatly appreciated by the committee if you would review the enclosed material relating to the proposed arrangement with Euratom and would send the committee your comments. These comments would be most helpful to the committee in connection with its consideration of this matter and will provide useful background information for committee hearings on the proposal.

Specifically, the committee would appreciate your views on the following:

1. Do you believe that the general approach and major provisions of the proposed arrangement are appropriate for our atomic program abroad?
2. Are the specific types of United States assistance provided for in the proposed arrangement desirable? If not, what other types of assistance would you suggest?
3. Do the types of assistance provided for pose any serious problems, from a technical or industrial standpoint, with regard to the sale of United States reactors, components, and fuel elements abroad?
4. Do you believe the types of reactors contemplated in the agreement are desirable for export abroad? Do you believe any other types should be included? If so, what are they?
5. What are your views as to the phasing or scheduling of the projects, particularly with regard to plans for selection of reactor types and the limiting date of 1963 for completion of construction?
6. Do you consider the cost estimate of $350 per kilowatt (exclusive of fuel) to be realistic?
7. Do you favor a system wherein the United States Government guarantees fuel element performance and in effect underwrites the fuel costs in this program?
8. Is the published information on AEC fuel reprocessing costs adequate for normal business negotiations in connection with the Euratom program?
9. What are the implications of this program for our own domestic program? Are there adequate provisions for making available to American industry the technical information developed in the joint research and development effort?

Any other comments you may have on the proposed arrangement would be welcome.

The committee is tentatively planning to hold hearings on the proposed arrangement with Euratom beginning about the second week in July. I recognize that the volume and complexity of the enclosed material will require some time for study and evaluation but it would be appreciated if you could send us your views as early as possible and not later than Wednesday, July 9, so that they

can be of maximum assistance in connection with the committee hearings. You appreciate, of course, that your comments may be incorporated into the hearing record.

Thank you very much for your cooperatiton.

Sincerely yours,

CARL T. DURHAM, *Chairman.*

APPENDIX 2

REPLIES TO JOINT COMMITTEE LETTER TO REACTOR EXPERTS AND INDUSTRIAL REPRESENTATIVES

(For the convenience of the reader, the replies are arranged alphabetically.)

ALCO PRODUCTS, INC.,
Schenectady, N. Y., July 9, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: Thank you very much for your letter of June 28 offering me an opportunity to comment on the proposed arrangements for cooperation with the Euratom group. I am keenly interested in the program and welcome the opportunity to comment. My own evaluation of the factors involved in the economics of nuclear power leaves me well on the conservative side with regard to the time when economic competition will be achieved. There is no question in my mind but what economic nuclear plants will be achieved, but I have been convinced for a long time that the road to success is long and difficult, and that the best route to the development of the new technology is through the construction and operation of small reactors. Despite these beliefs, however, it is obvious that the objectives and program established by the Euratom Commission cannot be disregarded in our supporting program.

With this general background, my reactions to the questions raised by your letter are as follows:

1. The general approach and major provisions in general seem quite appropriate for an American atomic energy program abroad. I am sure that experience will indicate a desire for revision in some areas, but there appears to be adequate flexibility in the arrangement for such changes.

2. The type of assistance offered appears reasonable, although I feel that the $50 million limitation on research and development is submarginal. Having built and operated the APPR–1, I am moved to say that there is no off-the-shelf reactor except an identical copy of one already successfully operated.

3. I don't foresee any serious problems with the types of assistance.

4. If the desire of Euratom to employ "proven types" is rigorously adhered to, it is my conviction that we have only the pressurized water reactor to offer. There is enough to do in exploration of even that supposedly well-developed reactor to engage a substantial development effort for some time to come. The boiling-water reactor's attractiveness is admitted, but there is much yet to learn about its operating characteristics, particularly with regard to stability and contamination associated with fuel-element failure. The organic moderated reactor lags behind the boiling reactor in the state of technological development, and this is, of course, reflected in the Euratom attitude. Certainly these two should be kept under close consideration, but the program should also follow as long-range prospects, the development work on all of the other reactors under development in our broad program.

5. I see no inordinately large problems associated with the 1963 completion target. As noted under item 4, however, I believe this will tend to restrict attention strongly to the pressurized water reactor.

6. I feel that the capital cost of $350 per kilowatt is optimistic for the first plant of two of a given type will be built. We will undoubtedly be successful in achieving this target in a small number of plants, but feel that the decrease from values currently experienced to $350 is not likely to be made in one step.

7. Governmental support of the fuel program is essential to competition in the foreign market. As stated in the agreement, the incentive for manu-

facturers to improve their performance appears to me to be rather less than it should be.

8. Many of us feel that the fuel-processing costs which are published are optimistic and that true costs will run 2 to 3 times higher. Again, however, this is a case where operating experience is essential before enough is known to be confident. The one area of confusion which does exist is in the cost for preliminary treatment of alternate fuel elements for those considered as reference material.

9. It seems to me that the implications of this program on our domestic program are more indirect than direct. With the coal and oil reserves that evist in America, it is hard to see how systems as inefficient as the pressurized water (and the current boiling and organic moderated reactors) will be able to develop low enough fuel costs to offset the built-in head wind of the high capital costs. Thus, the benefit to our program is one of increased activity generating the need for more manpower which in turn will develop a larger group of trained technologists who will think about ways and means of converting atoms to power. I am a firm believer that knowledge of one reactor system provides a strong base from which to undertake consideration of other more advanced systems.

There are adequate provisions for making the information available to American industries provided the people administering the program recognize their responsibility in this area. As is usual in such cases, the success of the program will probably depend more on the character of the individuals than on the exact mechnism established.

I hope that the above comments may be of value to you.

Very truly yours,

KENNETH KASSCHAU,
Manager of Engineering, Atomic Energy.

ALLIS-CHALMERS MANUFACTURING CO.,
Milwaukee, Wis., July 11, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SIR: This is in response to your invitation of our views on the questions raised in your letter of June 28, 1958, relating to the proposed arrangement with Euratom. Our comments are as follows:

1. We believe that the general approach and major provisions of the proposed arrangement are appropriate for the proposed Euratom program.

2. The United States assistance provided for in the proposed arrangements appears desirable, and should be helpful in achieving the objectives set forth.

3. The assistance provided for should not, in our opinion, pose any serious problems, from a technical or industrial standpoint, in the sale of United States reactor components and fuel elements abroad. On the other hand, the assistance should be most helpful in the solution of present problems in this regard.

4. We believe that the types of reactors contemplated in the agreement are desirable for export at this time because they have been proven to a greater extent than any other types. The way should be left open to include other types of reactors as soon as they have been proven to the extent that they are appropriate for the objectives of the program.

5. With respect to timing, there seems to be considerable uncertainty as to how long it will be before manufacturing and construction schedules can be started. It would appear to us that the limiting date of 1963 for completion of construction for the complete program as now planned is somewhat unrealistic and may not be met.

6. The cost estimate of $350 per kilowatt (exclusive of fuel) does not appear too unrealistic for a target for reactor plants which have, to considerable extent, already been built and proven. For others, experience indicates the figure may be too low.

7. For the purposes of this program, a system wherein the United States Government guarantees fuel element performance appears to be needed to enable American manufacturers to compete in the Euratom market.

8. The published information on AEC fuel-reprocessing costs provides a suitable basis for business negotiations as long as there is adequate informa-

tion published, regardless of how realistic it is. If adequate figures are published, and AEC stands behind them, they should be sufficient for negotiation purposes.

9. There seems to be a question that the proposed arrangement will provide adequate provisions for making available to American industry the technical information developed in the joint research and development effort. We believe it is most important that complete information be developed and made available to American industry. That is one of the essential byproducts we are paying for. This information and experience should be of great benefit to our domestic program.

Inasmuch as the risks and uncertainties in our domestic program are, to a great extent, in the fuel cycle, why not give more serious consideration in the area of Government assistance to the domestic program to the guaranty of fuel element performance?

Respectfully submitted.

R. M. CASPER.

AMERICAN STANDARD,
ATOMIC ENERGY DIVISION,
Mountain View, Calif., July 16, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: It was a pleasure to attend last week an industry meeting at the Atomic Energy Commission to review the proposed International Agreement between the Government of the United States and the European Atomic Energy Community, the related memorandum of understanding, the proposed agreement for cooperation, proposed enabling legislation, and related papers.

The task performed by the Atomic Energy Commission staff in developing this agreement and presenting this material to the industrial group was a splendid job, for which the commission should be congratulated. We believe the overall program that has been negotiated will further the United States' interest in promoting peaceful use of atomic energy and deserves the general support of American companies engaged in our atomic-energy effort. While we feel that certain provisions of the various agreements could be clarified so as to lessen concern felt by some in industry, on balance we are satisfied that the problems can be effectively dealt with through proper administration of the program. We feel sure, in the light of explanations given that the policies established by the Atomic Energy Commission, with the approval of the congressional committee, will assure such administration. Accordingly, American-Standard heartily endorses the program and urges approval of the agreements and related legislation as proposed.

We are writing urging that the joint committee take necessary action on this program during the current session. Because of our association with our Ideal-Standard subsidiary companies in the Euratom countries, American-Standard has a very serious interest in the European market for our atomic-energy products. We feel that if Congress is unable to take action on this agreement in the current session, United States producers of atomic equipment will be put at a serious competitive disadvantage in their efforts to sell in the Euratom countries.

Very truly yours,

FRANK A. PARKER,
Director, Atomic Energy Division.

LEMONT, ILL., *July 15, 1958.*

Representative CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.:

Dr. Norman Hilberry has not yet returned from the IAEA-sponsored team mission to South America and therefore has had no opportunity to comment on the Euratom proposal. In his absence I have asked Dr. Stephen Lawroski, director of our chemical-engineering division, and Dr. Bernard Spinrad, director of our reactor-engineering division, to review the proposal. Both agree with the general approach of the proposal, but make the following specific points:

B. I. Spinrad (1) Information on operation and performance data from such reactors should be of inestimable value in further lowering costs for domestic

application; (2) the $350 per kilowatt capital-cost estimate seems too high and may be an insufficient incentive to achieve economy; (3) the considerable expansion in nuclear thermal capacity envisioned certainly suggests that the "Eurochemical" fuel-processing proposal should be accelerated as much as possible; (4) the fuel-cycle cost guaranties appear too complicated. S. Lawroski: (1) The United States promises essentially a guaranteed overall fuel-cycle cost. This can be a costly program and it may also become necessary for the United States to help fund the construction of reprocessing plants abroad; (2) the specific areas of United States assistance provided are desirable, provided that there is arranged an adequate relay of information on operational experience and on research and development conducted abroad as part of this program. Both Drs. Spinrad and Lawroski emphasize that very careful and high-level consideration should be given to the manner in which the United States carries out its technical and administrative commitments with respect to Euratom development work and the specific evaluations of Euratom projects. They urge that such assignments be handled by the United States in such a manner to insure that they will not impede developmental and research efforts allied with potential domestic uses of atomic energy.

J. R. GILBREATH,
Assistant Laboratory Director, Argonne National Laboratory.

ASSOCIATED NUCLEONICS, INC.,
Garden City, N. Y, July 14, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SIR: The following comments concerning the proposed agreement with Euratom for cooperation in nuclear power development are submitted in answer to your letter of June 28:

Your letter requested specific comment on nine questions; our answers are given briefly below:

1. We believe that the general approach and major provisions of the proposed arrangement are appropriate in view of competitive offers being made by Great Britain and possibly others.

2. Subsidy in the form of a guaranteed fuel performance and a guaranteed arrangement for fuel reprocessing is in our opinion more desirable than outright subsidies on equipment or services.

3. We believe that certain requirements for participation in the proposed program offer serious problems. On page 7 of the memorandum of understanding, it is required that "all information developed in connection with the selected projects concerning designs, plans and specifications, construction costs, operations, and economics, will be delivered currently to the parties as developed and may be used, disseminated, or published by each party for any and all purposes as it sees fit without further obligation or payment." Taken literally, this is a requirement that all proprietary developments made by an engineering firm or manufacturer taking part in this program would immediately become public property within the community and the United States. This is a high price to pay for the modest immediate profit that might result from participation in the program since this procedure would reduce the possibilities of future profit.

It is customary for companies to furnish operating data for a specific plant but it is not customary to furnish all detailed design information and specifications or cost information. Neither is it customary for engineering firms to grant unrestricted rights to use detailed construction plans and designs.

4. The agreement as written mentions boiling-water or pressurized-water reactor systems and certainly these are the types most advanced in the United States. However, it should be made clear that if a Euratom utility company desires to purchase another system such system such as organic-moderated or other types well advanced in the United States, the proposed reactor could be accepted under the program. This possibility is implied in the wording of the agreement but it appears to us that the utility company making the purchase should have a predominant voice in the decision.

5. The completion of a million kilowatts of installed capacity by 1963 may be extremely difficult, since there are many details within the pro-

gram of cooperation to be developed. As an example, much work must be done in outlining the joint research-and-development program and in setting up the administrative groups to review projects and disseminate the resultant technical information. The limiting date of 1963 for completion may also eliminate from the program promising reactors now being designed but not ready for incorporation in a definite proposal.

6. The cost estimate of $350 per kilowatt exclusive of fuel appears possible of attainment in this program.

7. The United States Government guaranty of fuel-element performance limited to 10 years is a reasonable way to make United States nuclear-plant designs attractive. The details of handling such a guaranty program are extremely complicated and will involve very close technical collaboration among the Government, reactor designers, and the fuel-element fabricators as well as foreign utility-company operators. For example, a change in operating methods made by the utility could change fuel-element performance drastically and involve the United States Government in a detailed review of all the circumstances and the guaranties that may exist.

8. We are not sufficiently well informed on AEC fuel-reprocessing costs to comment intelligently on the suggested costs contained in the agreement.

9. We suggest additional clarification of the detailed arrangements that will be made for disseminating the technical information developed in the joint research-and-development effort. Adequate provisions should be made to insure complete disclosure of research information and the prompt circulation of reports. This has proven to be a major problem within our present United States Atomic Energy Commission research program. This item alone may call for the establishment of an experienced administrative group.

In summary, the proposed joint program should result in the early construction of American reactor systems in Europe that might not otherwise be built. It is obvious that the agreed-upon program is one that will strengthen the Euratom countries and for that reason has a high political value. The real benefit to American engineering and manufacturing companies is clouded by the requirement for disclosure of proprietary information, the lack of opportunity to secure patents, and the uncertainty of satisfactory provisions covering third-party liability. These matters should be explored thoroughly by all interested parties.

We, and our parent company, Stone & Webster Engineering Corp., appreciate the opportunity given us to comment on this program for Euratom cooperation.

Yours very truly,

W. E. KELLEY, *President.*

ATOMICS INTERNATIONAL,
DIVISION OF NORTH AMERICAN AVIATION, INC.,
July 11, 1958.

Subject: Comments on the proposed Euratom arrangements.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Washington, D. C.

DEAR CONGRESSMAN DURHAM: I appreciate the opportunity to comment on the proposed arrangement with Euratom for cooperation in nuclear power development. This arrangement definitely represents a forward step in achieving the objectives of furthering the development of atomic power, increasing the prestige of the United States abroad, and strengthening the solidarity of the western European countries. In view of the many complex details which are associated with the proposed arrangement, it perhaps would be most constructive if I commented upon the questions contained in your letter of June 28 in the order in which they are presented.

1. The general approach and major provisions of the proposed arrangement are definitely appropriate for our atomic-power program abroad.

2. The specific types of United States assistance suggested in the proposed arrangement are desirable.

3. The type of assistance provided does not pose any serious problem with regard to the sale of United States nuclear equipment abroad, with the possible reservation that the interests of the United States nuclear industry should be preserved relative to the European nuclear industry which will

be created by the arrangements proposed in the agreement. It appears to have been the intent of the framers of the agreement that United States industry would help create a European nuclear industry by means of industry-to-industry agreements privately arranged in this field. Some aspects of the proposed arrangement need further clarification in this regard.

Article VI of the agreement for cooperation provides that all nonpatentable information developed in connection with these selected projects, including designs, plans, and specifications, will be delivered to the parties and may be freely used without further payment. As written, this article could require that as a condition of sale a United States manufacturer freely provide for dissemination by Euratom all the detailed reactor designs, plans, and specifications which would have been generated by that manufacturer at his own expense in order to build the plant. This article, in combination with the other portions of the technical information exchange, training, and patents, would in effect turn over all of our privately financed as well as our Government-financed know-how and technology to European manufacturers who would then be in a preferred position to compete with us in the world market with our own technology. In a meeting with industrial representatives on July 8, 1958, the Commission staff stated that this article was not intended to turn over information developed with private funds and that the Commission would undertake, through an exchange of correspondence with Euratom, to establish an interpretation of this article.

Under this interpretation, the customer would receive, however, all information necessary for operating and understanding the technical features of the plants. Any further information could be acquired under private agreements between American manufacturers and European organizations, which is a procedure supported elsewhere in the proposed Euratom agreement.

4. While the agreement does not make specific reference to reactor types, the working papers clearly indicate that light-water reactors are primarily involved. As our company is already proposing large organic-moderated reactors on a firm-price, guaranteed-performance basis, we have explored with the Commission the possibility of including this reactor type in the proposed Euratom program. It is our understanding that the Commission is taking action to do this.

The most recent opportunity to propose a full-scale powerplant is the SENN invitation for a 150-megawatt powerplant in Italy. It has been publicly announced that three American reactor types were proposed in response to this invitation, the pressurized-water reactor, the boiling-water reactor, and the organic-moderated reactor. Presumably, therefore, these are at the moment the only types in which American manufacturers have sufficient confidence to quote abroad under the firm-price-guaranty conditions required by SENN.

I would recommend, however, that because of the rapidly developing nuclear art, opportunity should be provided for additional reactor types to be included in this program whenever a responsible manufacturer is prepared to undertake the price and guaranty commitments which are consistent with those of other reactor types included in this program.

5. The proposed schedule by which 1 million electrical kilowatts of nuclear-plant capacity would be in operation by 1963 may pose a planning problem for both American industry and Euratom. Such a schedule will require that six nuclear powerplants will have been contractually committed during 1959. This means that all six plants will be based upon present technology and will not be in a position to incorporate any significant future developments, except for fuel elements. Assuming that the 3 reactor types which have been mentioned in relation to the SENN invitation, the pressurized-water reactor, boiling-water reactor, and organic-moderated reactor are the only 3 types which the United States is prepared to offer during the coming year, it is clear that there would result simultaneous construction of several of one type of reactor.

6. The estimate upon which the total cost of the Euratom program has been based ($350 per kilowatt, exclusive of fuel) is undoubtedly adequate for the successful completion of the 1-million-kilowatt program. It is reasonable to expect that due to the lower cost of construction in Europe and the improvements which have already taken place in plant design, the actual expenditures under this program will probably be less than $300 per kilowatt.

7. I do favor the system wherein the United States Government underwrites the fuel cost for this program. As your committee may recall, in my testimony on February 21, 1958, during the annual section 202 hearings, I urged that the United States undertake a program of supporting the construction of atomic powerplants in foreign countries, utilizing United States technology, equipment, and fuel. The proposed Euratom arrangement is a substantial step in this direction.

8. The published information on the AEC fuel-processing charges is principally useful in reviewing with a potential utility customer the probable fuel-cycle cost. The commitments of the Commission in chemical reprocessing are limited to June 30, 1967, and thus cover only about 4 years of reactor operation. Further, the details of the chemical-reprocessing policy of the AEC as outlined in the Federal Register, March 12, 1957, requires that the reactor operator undertake a contract negotiation with the AEC for each type of reactor fuel to specifically determine the exact reprocessing charge. Additionally, the Commission has reserved the right to cancel on 12 months' notice any such contract when the Commission determines that the reprocessing is available commercially at what the Commission considers a reasonable price. Under such circumstances, the calculated fuel-reprocessing cost is primarily an estimate.

9. The United States domestic program for atomic-energy development has consistently stressed improvement in technology rather than the kilowatts of power. The proposed joint research-and-development program may make a significant contribution to the overall fuel-element technology of the United States. Improvements in fuel elements could be utilized by a variety of reactors. There should be no difficulty in obtaining information from Euratom on the results of the joint research-and-development program.

The arrangements for supporting the 1-million-kilowatt Euratom program might appropriately be considered for the domestic program of building developmental plants to improve our reactor technology. If similar fuel-element guaranties were provided to our domestic utility industry, it is likely that they would be encouraged to consider further participation in the development of our newest reactor concepts. In this regard, the pattern of support established by the Euratom arrangement may be a useful one to consider for our domestic program.

I trust the above comments will be of interest to the committee in considering the detailed implementation of the proposed arrangements with Euratom. I would like to reiterate my belief that this proposed international agreement is a sound, forward step in the development of atomic power abroad. The Atomic Energy Commission is to be congratulated for its vision, boldness, and energy in developing this program.

Sincerely yours,

NORTH AMERICAN AVIATION, INC.,
C. STARR, *Vice President.*

THE BABCOCK & WILCOX CO.,
New York, N. Y., July 10, 1958.

Re Euratom program.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR CONGRESSMAN DURHAM: We have reviewed your letter of June 28, 1958, have studied the material enclosed in your letter, and we set forth below our comments which we hope will be of assistance to you. These comments are contained in paragraphs numbered according to the specific questions which you ask in your letter:

1. We believe that the general approach and major provisions of the proposed arrangement are appropriate for the United States atomic-power program abroad and we urge strongly its implementation by Congress at its current session. We believe that great credit is due to the United States Atomic Energy Commission, the State Department, and your committee who have conceived this program of cooperation with Euratom. It seems to us that the program is mutually beneficial to the United States nuclear industry in greatly increasing practical experience looking forward to the day when

conventional fuels become less available and to the Euratom countries in giving them reasonably priced power at a relatively early date.

2. We believe that the specific types of United States assistance provided for in the proposed arrangement are desirable. The guaranty of fuel-cycle costs is particularly desirable in order to interest purchasers of nuclear equipment who desire to estimate their operating costs in advance as they are able to do in the case of conventional power, and it appears that the general provisions of the program take care of this problem.

3. We do not anticipate that the types of assistance provided for pose any serious problems, from a technical or industrial standpoint, with regard to the sale of United States reactors, components, and fuel elements abroad. However, commercial problems will result for American industry because the main objective of the program is to encourage a highly integrated and complete nuclear power industry abroad. This will probably result in very severe competition for United States manufacturers of equipment, not only in the Euratom countries but throughout the rest of the world. We believe that this disadvantage, which has always existed in the conventional power field, is inevitable and is outweighed by the opportunity to gain practical experience in American reactor types.

4. We believe that the types of reactors contemplated in the agreement are desirable for export abroad. If, as the program contemplates, all of the projects are to be selected in 1959 and are to be completed in 1963, and if one of the primary objectives is to provide reliable power to Euratom countries, we believe that the program should be restricted to pressurized water and boiling water types now operating or under construction in the United States. As a result of operating experience, modifications improving these pressurized-water and boiling-water reactor types will be made for many years to come.

5. We feel that the scheduling of the projects, with selection in 1959 and completion of construction in 1963, is an ambitious but desirable objective because it would be a means of securing a good and early foothold in Euratom countries for American pressurized-water and boiling-water reactor types. It would not be feasible from an engineering standpoint to develop something new. We believe that it would expedite the program if responsibility for the supply of the American equipment included in a project is centralized in one manufacturer having the facilities to produce the reactor, including the core and all other major components.

6. We consider that the cost estimate of $350 per kilowatt (exclusive of fuel) to be realistic.

7. As stated in paragraph 2 above, we feel that the fuel-element performance cannot be unconditionally guaranteed by manufacturers at this time and that a system wherein the United States Government participates in guaranteeing their performance and in effect underwrites fuel costs is most beneficial in promoting an early use of nuclear power on a basis competitive with conventional power.

8. We believe that the published information on AEC reprocessing costs is adequate for normal business negotiations in connection with the Euratom program.

9. The domestic program we are now involved in will not be affected by the Euratom program and the schedule now being contemplated. As stated above, we feel that the program will give the United States the benefits of practical experience with the two basic reactor types which have been so far favored in the United States. This should advance the day when nuclear power becomes economic in the United States.

As we were invited to do in your letter, we would like to comment on several other matters:

(*a*) We note that the proposed agreement for cooperation states that the United States Government and Euratom recognize the necessity for protection against third-party liability and there is a statement that Euratom will seek to develop and secure such protection. We consider this to be a matter of great importance to American industry and one that should be continuously and vigorously pressed. We understand that British industry in its sales abroad benefits from some type of indemnity protection from the British Government.

(*b*) The proposed agreement for cooperation provides that nonpatentable information developed in connection with the joint program of research and development and in connection with the selected projects may be freely

used and disseminated. We think these provisions should be interpreted in such a way that American manufacturers not be required to disclose their background manufacturing information, much of which was developed at great cost in their conventional or nonnuclear business. We agree with a suggestion that has been made that the manufacturers should sell equipment for these Euratom reactor projects on the same basis they sell their conventional products, that is, only with information sufficient to permit installation, operation, and maintenance of the equipment.

(*c*) We assume that, in accordance with past practices, the amount of the Export-Import Bank loans will be expended in the United States.

(*d*) The various documents provided with your letter do not give any indication of where the $50 million for research and development to be contributed by the United States will be spent, although we understand that the United States Atomic Energy Commission believes it should be spent in the United States. We favor such a policy. This should promote scientific development in the United States, certainly an important subsidiary benefit of this program. As a company which has pioneered many developments in the conventional power field, we feel that it is important to American industry to participate directly in this research and development work and not to be merely a recipient of data developed by others.

We hope that the above material will prove to be helpful to your committee. We also wish to acknowledge receipt of a telegram postponing your hearings until the week of July 14.

Very truly yours,

M. NIELSON, *President.*

[Telegram]

SAN FRANCISCO, CALIF., *July 14, 1958.*

CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States:

As you requested we have reviewed proposed agreement for Euratom cooperation in nuclear-power development and we believe program as outlined is appropriate and presents a workable arrangement within which details for satsifactory administration and execution can be developed.

BECHTEL CORP.,
J. P. YATES,
Executive Vice President.

BLAW-KNOX CO.,
CHEMICAL PLANTS DIVISION,
Pittsburgh, Pa., July 14, 1958.

Hon. CART T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SIR: We wish to thank you for your letter of June 28, 1958, requesting comments on the Euratom arrangements. We feel, however, that we are not in a position to comment on most of the proposed arrangements since they refer primarily to the power program, which is outside our primary field of interest in nuclear energy.

With regard to the subject of fuel-element life and reprocessing, we feel that we can contribute some comments which have been confirmed by our experience in the field of fuel-element reprocessing, in both Government and private work.

Many comments were made early in the development phases that the fuel-cycles costs, and particularly reprocessing, are the key to economic nuclear power. More recently, this view has become more realistic in that it is being appreciated that this cost is only one of many in the nuclear power cycle, all of which must be reduced for economic nuclear power. A most effective way of reducing fuel-cycle cost per unit of energy produced is to spread the same cost over more units by extending the performance life of the element. This extension of life is one of the price factors in fuel-cycle costs, and as yet we have insufficient experience to guarantee the 10,000 megawatt-days and higher exposures envisioned in much of the economics of nuclear power. To remove this unknown in the fuel-cycle costs, some risk must be taken. American companies fabricating fuel elements are not prepared to assume such risks.

However, where such risks should or must be taken as a policy of international diplomacy, the United States Government should assume those risks.

The recently published information on AEC fuel-reprocessing costs did not prove to be a basis for normal business negotiations in connection with the domestic power demonstration program. It would be reasonable to assume that they would be no more suitable for the Euratom arrangements. Rather than using assumed conditions to establish a price for negotiation, we feel that this problem should be approached from the actual conditions to be met, of load, fuel composition, processing techniques available, supporting facilities available, and business arrangements possible.

We appreciate the opportunity of submitting these comments and trust they shall be of value to you in your hearings. Do not hesitate to call on us again for whatever assistance you may feel we can supply.

Very truly yours,

R. E. MOSER,
Vice President—Contract Manager.

BURNS & ROE, INC.,
New York, N. Y., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman of the Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SIR: We have reviewed the proposed agreement with Euratom Communities for cooperation in nuclear power developments" which was attached to your letter of June 28, 1958.

You and your committee are to be congratulated on a complete, excellent program that will not only fill a real need for the Euratom Communities, but will also hasten the day when nuclear power will be competitive with fossil-fueled plants in the United States.

In brief, we are in agreement with the aims and objectives of your proposed plan. Your letter asks for our views on specific questions; we are pleased to supply the answers requested.

1. (*a*) The general approach is to design, construct, and operate nuclear powerplants for the purpose of improving the economic dollar balance of the Euratom Communities, increasing their available power supply, and striving for economic nuclear power. We are in complete agreement with these principles.

(*b*) You also ask, are "* * * major provisions * * * appropriate for our atomic-power program abroad?"

In order to benefit the atomic program, reactors must be built. The country building the reactors will increase their technology, and thus benefit their own program. For the short-term basis, the installation of 1 million kilowatts will definitely improve the world atomic program. If most of the reactors, components and designs are supplied from America, then this will benefit the American program. However, one expressed intent and purpose of Euratom is to increase the technology of participating countries, so that their industry can gain knowledge and competence in the production of reactor components, with the aim of supplying equipment for the balance of the program. We believe that this initial program of 1 million kilowatts will be of assistance to industry in the Euratom countries but we are doubtful if the rest of the program beyond the initial 1 million kilowatts will necessarily follow the type of reactor used intially.

Throughout this program the term "proven reactor, developed in the United States" occurs; this, obviously, means either a pressurized-water reactor or a boiling-water reactor. For an operating date of 1963, these reactors are suitable. However, from the point of view of competitive power in the United States, a more advanced type will have to be developed, due to the low cost of our fossil fuel and the high first cost of reactor powerplants.

The development of the ultimate reactor for the United States must proceed by stages and the Euratom program includes research and development for improvements in fuel fabrication, burn-up, chemical processing, reactor materials, etc. Thus, this outlined program should bring closer the day of economic nuclear power in the United States.

Therefore, we believe this program will be beneficial to our atomic program.

2. The assistance offered in the proposed agreement is of three types:

(*a*) Financial—through long-term, low-interest loans;

(*b*) Research and development—through use of personnel and facilities, and a dollar contribution;

(*c*) Fuel—through making U–235 available, and guaranteeing costs.

The assistance set forth above is most desirable but, in addition the American nuclear industry and its consultants and engineers should provide the knowledge and know-how to design, construct, and operate each powerplant, to supplement the knowledge of the engineers in the Euratom countries.

The proposed arrangement has failed to mention the contribution which can be made by consulting engineers such as ourselves who are familiar with atomic problems. These consulting engineers are not designers and manufacturers of individual components but are consultants and coordinators who take those components and assist in combining them in a most reliable total plant and one which would give the lowest cost of producing kilowatt-hour electrical energy.

Throughout the proposed agreement, the role of the manufacturer has been defined and emphasized. The quality of the equipment manufactured and supplied as part of the plant is of great importance; therefore, the manufacturer has an important part in the design of any powerplant. However, the consulting engineer, particularly in the nuclear-power field, also has an important role. His is the task of specifying equipment, making equipment arrangements, determining operating characteristics, and providing supervision of construction. In brief, the consulting engineer must translate the desires of the client into a constructed plant, designed for the particular location and environment in which the plan will operate.

The Euratom countries desire to use as much locally manufactured equipment as possible. In order that this locally manufactured equipment and the equipment manufactured in America will constitute an efficient operating plant, the role of the consulting engineer must be emphasized.

In addition, American industry must be willing to train, in American plants and organizations, personnel from Euratom countries. It is not sufficient to make printed information available; practical working experience must also be made available. This applies to all phases from research and development through to the operation and maintenance of the plant.

3. With regard to the sale of United States reactors, components, and fuel elements abroad for the first 1 million kilowatts, the assistance provided for does not pose any serious problems (reference is made to par. 2 which defines further assistance that we feel will be necessary to obtain the desired results).

After 1963, European manufacturers will supply most of the equipment used in the second stage of the program. Therefore, United States industry should be able to compete for the world market outside of Europe and, with some degree of success, on the special components in the European market.

Therefore, we would not envision any serious industrial problem until the completion of the Euratom goal of 15 million kilowatts is established.

4. With a scheduled operation in 1963, the only reactor types that should be considered for export are pressurized- or boiling-water types, although the organic moderated, fast breeder, sodium graphite, and homogeneous aqueous reactors are in the pilot-plant stage and are developing rapidly We would say they still require investigation before they are "proven." It is of utmost importance that the criteria of "proven" expressed in the proposed agreement be strictly enforced because of the risks involved in transplanting nuclear technology to less experienced European personnel.

While we agreed that the only reactors proven sufficiently for use in the European market today are undoubtedly the pressurized or boiling-water types, by 1963 it is very likely that some of the more efficient and more advanced types will be sufficiently developed to be considered proven and, therefore, it may well be that the balance of the second step of the program will take advantage of the developments between now and 1963. This probably would mean that to the extent this experience was the result of work in the United States, assistance would still have to be given to the Euratom countries program to the extent they utilize these advanced types.

5. The 1963 completion date is reasonable for the water-type reactors. The Shippingport or Dresden type plant can be duplicated in the United

States in approximately 3 years. Installation in Europe will result in a loss of motion which has been taken into account in the scheduling. In addition, deliveries and extended inspections both in this country and in Europe will require additional time. However, we would anticipate that the 4-year scheduling is adequate for the pressurized and boiling-water type reactors provided engineering and design is initiated in early 1959.

6. It is still too early to state whether $350 per kilowatt (exclusive of fuel) is a realistic constructed cost for the water-moderated cooled-reactor type. The cost of Shippingport, which is comparable in size to the proposed units for Euratom, is appreciably greater than the $350 per kilowatt. Other published figures of large plants such as that of Dresden, Indian Point, and Yankee Electric are still preliminary since construction is not complete. There are many factors that can vary the plant's cost such as labor cost and productivity and site conditions. For example, the site conditions might require unusually heavy foundations which can seriously affect the total construction cost. The fact that construction labor cost is less in Europe than it is in the United States may, however, make it possible to build these plants for $350 per kilowatt.

7. The system wherein the United States Government guarantees fuel-element performance and in effect underwrites fuel costs is necessary if the Euratom investors are to have some assurance of the cost of nuclear power. Fuel costs are still unknown because of limited production. It is commendable that such a positive step be taken to fix fuel costs. This plan will define in detail those areas of the fuel cycle which require improvements and/or reductions in costs. The intent of the United States Government should be to transfer this guaranteed fuel-cost contract to United States manufacturers.

8. The published information that we have received regarding the AEC fuel-reprocessing costs have been adequate for our studies and we believe are suitable for the Euratom program.

9. This program will decrease the necessity of United States utilities investing in large nuclear plants in order to determine whether there is an economical advantage at this time. Euratom will act as a trial-and-development area and permit United States utilities to bide their time before investing heavily. The proposed agreement appears to have adequate provisions to make available to American industry the information developed on the joint research-and-development effort.

We hope this information will be of assistance to you in connection with the proposed committee hearings. If we can be of further assistance to you in any way, we will be more than happy to cooperate.

Sincerely,

R. C. ROE, *President.*

CATALYTIC CONSTRUCTION CO.,
Philadelphia, Pa., July 9, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

SIR: Please refer to your letter dated June 28 and to the telegram from Mr. Ramey dated July 3 in regard to our comments on the proposed agreement with Euratom for cooperation in nuclear power development.

We appreciate the consideration you have shown us in extending this opportunity to express our views on this topic and to answer the nine specific questions contained in your letter. We do not believe, however, that we are in a position to be of real assistance to you on the subject at hand. Our company has extensive experience in the fields of raw materials, feed materials, and fuel reprocessing, but we have not undertaken serious work on power reactors; consequently, we cannot give responsible answers to the questions which you have raised.

We regret that we cannot be more helpful to you, but trust you will give us other opportunities to cooperate.

Sincerely yours,

T. ELWOOD WEBSTER, *President.*

COMBUSTION ENGINEERING, INC.,
New York, N. Y., July 16, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: Combustion Engineering has examined with great interest the materials that you forwarded in your letter of June 28, 1958, with respect to Euratom.

It would seem to us that the time for the questions raised by your letter has now definitely passed. The materials were negotiated out in good faith by both the AEC and the State Department with Euratom in an incredibly short time. At the time of the negotiations, the representatives of these agencies knew the general position of most members of industry; they knew the nature of the British offers; and they knew the problems faced by Euratom. While perhaps the documents do not contain the exact provisions that others would have negotiated, on the whole, however, they seem to have been designed and drafted with the best of intentions to speed the Euratom program along.

Since so much of the Euratom program is based on the desire to free the six nations in Western Europe from dependence on Middle East sources of oil, among other sources of fuel, the recent events in the Middle East would seem to have given added impetus to the necessity of having the program speed along as fast as possible.

Thank you for requesting our views on the materials.

Sincerely yours,

JOSEPH V. SANTRY.

COMMONWEALTH ASSOCIATES, INC.,
Jackson, Mich., July 9, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: We were very glad to receive your letter of June 28 and a copy of the proposed agreement with Euratom which the President has submitted to the Congress. A study of the agreement and its supporting documents indicates that a very concerted effort has been made to prepare a joint program which will result in the building of several major atomic powerplants from which can be obtained large-scale capital costs and operating data so badly needed to continue the advances already achieved.

To identify ourselves we should state that Commonwealth Associates, Inc., is a consulting engineering and design organization which, with its predecessors, has served the light and power industry for many years. Our activities have spanned almost the entire period of modern steam-electric plant development, during which time it is estimated that we have prepared comprehensive studies, preliminary designs, capital costs, operating costs, and detailed drawings for more than 5 million kilowatts of generating plants. In 1953 we became actively identified with nuclear research and development, and early in 1956 we were selected to serve as architect-engineer for the Enrico Fermi Atomic Powerplant. Since then we have been actively engaged in preparing specifications and detailed design drawings for this project.

Our experience on the Enrico Fermi plant has made it clear that the detailed design of a reactor plant requires knowledge and experience in mechanical, structural and electrical engineering problems which come only from years of continuous association with the design of steam-electric-generating plants. To continue this kind of experience into the design of nuclear plants is, we believe, essential to the development of economical plants in both the United States and foreign countries. This seems to be often overlooked in the planning of atomic plants where first attention must always be given to the nuclear process, type of reactor, capital and operating costs, fuel cycles, processing, indemnities, and other factors. This is not surprising because the cost of engineering is not large in comparison to the cost of buildings, equipment, and other plant items. However, capital costs may be affected greatly by engineering planning and design for any project.

The above paragraphs are by way of introduction to our approach to your request of June 28 that we give you our comments on the President's proposed agreement with Euratom for cooperation in nuclear-power development under the appropriate sections of the Atomic Energy Act of 1954. In view of the fact that

our principal background derives from our experience as architect-engineer on nuclear plants—as contrasted to equipment manufacturer or fuel supplier—we hesitate to comment on all the questions included in your letter. However, we appreciate very much the opportunity to comment on some of your questions as follows:

1. Do you believe that the general approach and major provisions of the proposed arrangement are appropriate for our atomic-power program abroad?

We believe that the proposed agreement is satisfactory in that it will not only act as a major incentive toward the establishment of large-scale atomic powerplants in Europe but it will also provide this country the opportunity to furnish equipment, materials, designs, services, and experience associated therewith. By so doing, continuous progress in the art can continue during a period when similar large-scale projects in this country may not be economically justified. The activities necessary to fulfill the United States commitments under this proposed agreement should enable United States companies now well established in this field to continue with renewed faith in their future.

2. Are the specific types of United States assistance provided for in the proposed arrangement desirable? If not, what other types of assistance would you suggest?

It would seem to us that the types of assistance provided for in the proposed agreement are most desirable and necessary to the orderly development of a program of this magnitude. It appears that assistance has been made available in every respect except that provided by the architect-engineer. In fact, it is not clear that the proposed agreement provides any specific opportunity for the architect-engineer to participate in the program. It might be construed, however, that architect-engineering services are a part of the proposed agreement although they are not specifically mentioned. In Mr. Strauss' letter of transmittal to you of June 23 it is stated (p. 4, par. 2) that "One of the major purposes of the proposed program would be to provide industry in the United States and Europe with important engineering experience and data on capital and operating costs." Architect-engineering firms normally prepare capital cost estimates for a project based upon preliminary drawings which they prepare and which are necessary before adequate final cost estimates can be made. Preliminary drawings show the property layout and the size, location, and number of buildings and other facilities required to accommodate the equipment for a complete operating plant. It is not clear from this statement that the essential function of he architect-engineer is intended to be recognized.

Neither is the architect-engineer position clearly indicated in the various appendixes attached. In appendix D, Agreement for Cooperation, article VI, paragraph A. 1, page 6, reference is made to "* * * designs, plans, and specifications, construction costs * * *." Also in paragraph D of article VI a parenthetical reference is made to "* * * including designs, drawings, and specifications * * *." These are the only specific references to these items outside of the working papers, appendix H, where it is stated under "*Incentives*," page 7, paragraph 5, that "All information developed in connection with the selected projects, including research and development information and design, construction, operating, and economic data, shall be made freely and fully available * * *." Working Paper IX, A. II., "Specific Needs," page 42, refers to "a. *Design Engineering Experience*," but the paragraph appears to be directed more toward operating engineering than to basic planning and design of new plants.

We can summarize our comments on this question by suggesting that it might be proper to include a section, a paragraph or a sentence in the agreement for cooperation, appendix D, which would specifically indicate the importance of the architect-engineer function and require that this function be carried out by qualified individuals or firms having recognized professional competence. Further, it is suggested that the preparation of plans, estimates, and schedules upon which cooperative undertakings are to be based be assigned to such architect-engineers.

6. Do you consider the cost estimate of $350 per kilowatt (exclusive of fuel) to be realistic?

While it is most difficult to estimate capital costs without having a complete knowledge of size, type, and country of installation, be believe that the estimate of $350 per kilowatt is a reasonable assumption for capital costs not including fuel.

These suggestions come as the result of many years of experience in plant design work and we respectfully offer them for your consideration. It is our sincere hope that they will be helpful to you during the hearings on the proposed agreement.

Sincerely yours,

E. V. SAYLES, *Vice President.*

E. I. DU PONT DE NEMOURS & CO., INC.,
ATOMIC ENERGY DIVISION,
Wilmington, Del., July 10, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy, Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: This letter is in answer to your request of June 28, 1958, for comments on the Euratom proposal as embodied in a group of documents that you sent me. The numbers used below correspond to the numbered questions in your letter.

1. I see nothing inappropriate for our atomic-power program abroad in the general approach and major provisions of the proposed arrangement. As I studied the documents two general comments came to mind. First, it is a characteristic of this arrangement, and I believe a reasonable one, that it takes an optimistic view of the results to be obtained from the proposed development program and even of the meaning for the future of results already achieved. One task of your committee is to assure itself that the optimism is moderate rather than extreme. In later paragraphs, accordingly, I shall have more to say about optimism, especially in technical matters, with which I am more familiar than I am with matters of national policy.

Second, these documents can set forth only the broad outlines of the undertaking. Many details will have to be worked out. It is not reasonable to try to foresee all the difficulties and spell out the ways in which they are to be handled: something must be left to the will of the participants to get on with the job. You must have had much experience with this aspect; I have not. As a result some of my later comments may touch on things that are too much matters of detail to be useful to you.

2. The specific types of United States assistance provided for in the proposed arrangement seem desirable to me. Perhaps this is the proper place for me to say that I found it hard to be sure whether the agreement for cooperation overrides the memorandum of understanding. I infer that this is so. Where the two documents differ, the agreement for cooperation seems to me to have the preferable wording. An example is in the wording of the items that have to do with the exchange of information, where article VI, sections B and C, of the agreement for cooperation seem much better than the corresponding items 5A and 6B of the memorandum. In fact this last item would seem to commit the United States to full and prompt disclosure of the results of our work on thermonuclear power, which may be quite contrary to your desire.

Another place where the agreement for cooperation seems an improvement on the memorandum is in the presence of article VI, section D, stating that each party has the responsibility for the application or use of information received from the other. Such an item does not occur in the memorandum at all.

3. I have so little contact with the sale of United States reactors that I shall not try to assess the sales problems that are posed by the types of assistance provided for in the agreement.

4 and 5. The question of appropriate types of reactors for the Euratom program is so closely linked to the question of phasing and scheduling that I should like to discuss them together. The pressurized-water reactor and the boiling-water reactor are specifically mentioned in the documents as in the most advanced state of development and accordingly most ready for use in the Euratom program. I do not know how far along the Euratom Community is in bringing together and training the necessary development, design, constructing, and even operating groups. They may be so near the beginning of the task, their means for attacking it may be so limited, and the urgency of the need for 1 million kilowatts of nuclear electricity by 1963 may be so great that only these 2 types can be considered.

If, on the other hand, their technical manpower is already trained and organized, or the 1963 date can be relaxed, I should be in favor of allowing for the introduction of other types. In this I am in agreement with Mr. Kohnstamm's letter of May 18, 1958. In the present state of development it would be lamentable to build 3 pressurized-water and 3 boiling-water reactors, with all 3 members of each trio the same or only minutely different. If the need for electricity from nuclear sources by 1963 is such as to require two or more reactors of the same general sort, an effort should be made to have similar units demonstrate the relative merits of at least a few alternative features.

We seem to have hit on a figure of 5 years as an appropriate time for development, design, construction, and initial proof of a power reactor. Actually with a new organization this time implies a level of activity just lower than that characterized by the word "crash." My feeling is that the 1963 date for completion of the reactor program has been expressed too rigidly. It might be well to extend the time for completing the initial phases of the program to as late as 1965 if that would permit the introduction, for example, of an advanced offspring of the pressurized-water and boiling-water devices in which forced circulation and some boiling occur, or of sodium graphite, heavy-water, or organic-cooled reactors.

I do not, however, think that the other dates in the documents, such as 1973 expiration of guaranties, need to be similarly treated.

6. The cost estimate of $350 per kilowatt seems low but not unreasonable to me and the men I have talked to. None of us has enough knowledge of European conditions to criticize the figure properly. To arrive at an overall cost one might start by separating a United States cost estimate into materials and labor, and multiplying each by a factor to convert to the European site. This course would be rapid but rather crude. The United States cost estimate might easily be optimistic to begin with, and the labor factor, especially, might be based on the cost per man-day without allowing for differences in productivity between the United States and Western Europe. The result then would be too low a figure. On the other hand, an informed European estimator given a detailed United States cost estimate and a reasonable time, or given a design only and a longer time, could produce a good estimate for European conditions. I can only suggest that you try to find out the nature of the process by which the $350 figure was arrived at and then form a judgment as to its optimism. It would not be astonishing to me to find that the $350 million would buy 5 rather than 6 reactors, for example.

7. Guaranteeing fuel-element performance is a way to get ahead with the job. I see no reason not to favor it for the purposes of the Euratom program.

It is proposed that we guarantee the fuel elements for an average exposure of 10,000 megawatt-days per metric ton of contained uranium (attachment A to memorandum of understanding). Although it is well understood by those familiar with the subject, I think it would be wise to specify explicitly that this exposure is in thermal megawatt-days, not electrical. Otherwise we might find ourselves guaranteeing a life 3 to 5 times as long as we meant.

A guaranty of 10,000 megawatt-days per ton average exposure (such as is proposed in attachment A to the memorandum of understanding) seems fairly generous. Unless the neutron flux in the reactor is shaped by rather expensive devices, an average of 10,000 megawatt-days per ton will entail local exposures well over 20,000 megawatt-days per ton. (Note that flux-shaping devices are likely to increase the cost of a reactor of given physical size, but by increasing its electrical output at the same time may actually reduce the cost per kilowatt of installed capacity.) Such exposures are high for natural uranium metal. I understand that they have been obtained in some elements that have an expensive sound. The nature of the guaranty, however, which is to pay for only the excess costs arising because the fuel elements do not reach 10,000 megawatt-days, with a credit against such costs if elements come along with superior performance, cuts down the financial risk by a significant amount. In this connection I noted that the excess costs will accrue and can be wiped out by credits for superior performance, but that such credits do not accrue to allow for a run of bad luck. While the parties might not feel it necessary or desirable to have such credits ever result in an actual payment to the United States, it would not seem unreasonable to have them accrue. To be sure, the amounts of money involved may not be worth the bother. On the other hand, having a credit might make the parties a little more adventurous in trying out a new fuel element, and thus advance the art.

I can also see room for argument in the provision in paragraph 5 of page 18 of attachment A to the memorandum of agreement having to do with the decision to remove fuel elements before overt failure has occurred.

I note that annex A to the agreement for cooperation covering the matter of guaranties is much more general than attachment A to the memorandum. Annex A seems preferable to me, as it leaves the determination of the exact figure for the guaranty to be determined by negotiation and agreement at a time when an appropriate figure can be better determined than now.

8. It seems reasonable to me to offer to process Euratom's exposed fuel elements on the same basis as those from domestic power reactors. The fuel-processing man I talked to gave it as his opinion that a process for elements clad with zirconium or zircaloy is more nearly in hand than one for elements clad in stainless steel. It might be that no more optimism is required for including stainless-steel cladding on the same footing as zirconium than is characteristic of other parts of the overall plan and that that degree of developmental optimism is quite justified. On the other hand, you may wish to inquire into our ability now or in the future to handle stainless-clad elements by the means proposed.

The only other dubious point that I see in the proposal arises from AEC Release 999, AEC Notice Outlines Basis for Chemical Processing Contracts, included as attachment 2 to working paper V in the documents you sent me. Here it is said in item 1, page 27, that the conceptual plant will have a standard processing charge of $15,300 per operating day and an assumed daily capacity of 1 ton of natural or slightly enriched uranium. If this means simply that the cost to Euratom will be $15,300 per ton of contained uranium it seems "adequate for normal business negotiations." But if it means that Euratom will be charged extra for deviations from an imaginary standard plant in order to handle deviations from an imaginary standard fuel element, its adequacy is questionable.

9. The needs of the United States for atomic energy seem well served by the Euratom program. We will be getting the valuable experience that comes from large-scale operation of nuclear reactors by people who need the power soon and are tightly engaged in an effort to make it competitive with or cheaper than power from conventional sources. The advantages to the United States are well set forth in chapter 5 of working paper I.

As I read the documents I was impressed with the careful way in which the obligation to share development and performance data was spelled out. It was obvious that an attempt was being made to make sure that neither party could make use of a third party to screen off information on this program from the other.

Very truly yours,

HOOD WORTHINGTON,
Director, Technical Division.

ERASCO SERVICES, INC.,
New York, N. Y., July 7, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR CONGRESSMAN DURHAM: As requested in your letter of June 28, 1958, we have reviewed the material relating to the proposed arrangement with Euratom and offer the following comments. Numbering corresponds to the specific questions raised by your letter.

1. We believe that the general approach and major provisions of the proposed arrangement provide an excellent basis for the development of an atomic program abroad based on technology developed by the United States.

2. In general, the specific types of United States assistance proposed offer the maximum incentive appropriate and should generate the maximum progress toward competitive nuclear power that is possible without a direct subsidy.

3. In the long run, the assistance provided will accelerate the development of a European nuclear capability that is largely independent of United States suppliers of reactors, components and, eventually, fuel-element fabricators. We believe that the provisions regarding availability of information go somewhat beyond that needed to accomplish the objectives of the program from the viewpoint of the interests of the United States and of the American manufacturer. Article VI A. 1 stipulates that "all nonpatentable

information developed in connection with the selected projects, concerning designs, plans and specifications, construction costs, operations and economics will be delivered currently to the parties as developed and may be used, disseminated, or published by each party for any and all purposes as it sees fit without further obligation or payment." Wide dissemination of data on construction costs, operations, and economics is appropriate and desirable and there can be no objection to sharing information developed under the joint program of research and development. However, under normal business arrangements an equipment manufacturer frequently develops information of a nonpatentable nature which, although disclosed to the client for his use is not as a matter of course passed on to every competitor. This is a matter which should be of considerable concern to reactor or component manufacturers but is of some interest also to engineer-constructors.

In the same vein, article VI B provides for a general exchange of other unclassified information in fields related to the peaceful uses of atomic energy. The corresponding section of the memorandum of understanding (sec. 6B) requires that such information be exchanged "fully and promptly" and defines specific areas of information for exchange, including advanced civilian reactor design. Should the implementation follow the pattern suggested by the memorandum of understanding to the extent that all information on advanced designs of all reactor types, no matter how unrelated to the joint program, is transmitted, the United States reactor manufacturer would lose any advantage he might otherwise enjoy over his European competitors.

It is not clear whether a United States contractor would be entitled to any patent rights resulting from inventions conceived during work related to the supply of a reactor or components to a project under the agreement. If the AEC should insist on a surrender of patent rights on the grounds that the fuel cycle guaranty represents assistance—which seems to be consistent with the established pattern of AEC policy—the supplier is placed at a further disadvantage beyond that encountered in domestic projects.

Although the agreement would permit purchase of a reactor system on the basis of competitive bids (as was followed for the SENN project) the forms of assistance tend to encourage the design of the reactor system by Europeans and purchase of components from European sources whenever possible. Since manufacturing costs in Europe tend to be lower, the opportunities to sell United States products will be very limited.

4. We understand that the only restriction as to type of reactor is that they be proven types of which research and development have been carried to an advanced stage in the United States. Quite clearly a reactor type meeting this definition is appropriate provided it also shows reasonable economic promise. Inasmuch as the selection of reactor types for research and development in the United States has been on the basis of economic considerations which should hold equally well in Europe, there is every reason to believe that the most promising types for early application do meet the above definition. Only an unexpected technological breakthrough would make a reactor type not now at an advanced stage appear more attractive. As a practical matter, the section of a particular reactor type for a given project would be based on an expert evaluation which indicates for the selected type not only economic promise but an acceptable risk regarding performance.

5. It is our understanding that the goal of 1 million kilowatts by 1963 is a target. We fail to note any specific limiting date either in the draft agreement or in the supporting documents. Whether this goal is met depends primarily on whether the utilities in the member states are able to accept the risks and financial burdens they would be called on to bear. There is no technical reason why plants could not be built in the number and size contemplated within 5 years. A potential cause of failure to meet this schedule would be possible failure to obtain adequate provision for protection against third-party liability at an early date.

6. We would agree that $350 per kilowatt is a reasonable estimate of an average cost for 6 to 8 nuclear plants of 100- to 150-kilowatt capability, excluding the fuel and cost escalation due to inflation, unless the attempt is made to build plants of maximum variety. Building plants of six unique designs would obviously run the cost above that required if only a few types showing minimum capital cost were selected. Some types might be selected which call for more than $350 per kilowatt, but we firmly believe that plants, especially second-generation plants, can be built below this figure.

7. Our answer to this question must be qualified. The example spelled out in attachment A to the memorandum of understanding is reasonable and we would favor the specific provisions of this particular system. However, we would not care to give blanket approval, sight unseen, to every system of United States Government underwriting which could be conceived. In principle we do not believe it is proper to force the development of a nuclear power industry which cannot stand on its own feet without a continuing subsidy. For this reason we do not favor artificially low charges for nuclear fuel, nor would we favor the underwriting of fuel cycle costs below a value which there was a reasonable expectation of meeting. We believe that fuel fabricators can meet or exceed the specified standard warranties regarding integrity and fabrication cost with acceptable risk—perhaps not for the first core but early in the 10-year period of the proposed AEC guaranty. Thus, we believe that the $90 million appropriation request is more than ample to cover any possible cost to AEC resulting from its guaranty and there is a good chance that net cost of the guaranty would be zero.

8. We believe the published information on AEC fuel-processing costs is adequate for normal business negotiations in connection with the Euratom program so far as they concern the reactor manufacturer or constructor. It is our understanding that arrangements for processing of fuels would be made by negotiation between AEC and either Euratom or the operating utility. Hence the published processing costs can be considered appropriate for such negotiations. In the viewpoint of a potential fuel processor there may be some question whether published AEC processing costs are realistic, considering that no facility exists for performing the processing, but this opinion would not reflect on the adequacy of the published information.

9. There is no doubt that information developed in the course of constructing and operating nuclear plants on the scale proposed would be of use for our domestic program. The agreement makes adequate provision for making the information developed on the joint research and development available to American industry. It is necessary that such information for the most part funnel through AEC. This seems to be unavoidable and the ultimate dissemination of the information will be dependent on AEC policies. A possible result of the program could be the availability of European manufactured nuclear components for the American utility industry at prices below those of United States manufacturers.

Very truly yours,

W. H. COLQUHOUN.

THE FLUOR CORP., LTD.,
Los Angeles, Calif., July 8, 1958.

Hon. CARL. T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
House of Representatives, Washington, D. C.

DEAR MR. DURHAM: We have reviewed the material you sent up covering the proposed agreement between the United States and Euratom for cooperation in nuclear-power development. As requested, we are pleased to comment on the points specifically noted in your letter of June 28, 1958.

1. Without full knowledge of the atomic-power program abroad, it is difficult to comment on the appropriateness of the proposed arrangement. On the other hand, we find the proposal to be a reasonable approach toward the joint effort with Euratom, and we believe that it contains the necessary provisions to make it functional.

2. The specific types of United States assistance provided in the proposal seems to be reasonable. We question the necessity of our having to guarantee the fuel-cycle cost but, on the other hand, assume this is a necessary incentive to get Euratom to construct the proposed plants in the immediate future.

3. The questions involved in your like-numbered paragraph might be more appropriately answered by the various American manufacturers and vendors of reactors, components, and fuel elements. In our position as an engineering and construction firm, we are not so apt to experience the great majority of the technical and industrial problems which this proposal may generate.

4. In general, we believe that the types of reactors contemplated are desirable for export abroad. If the program were to get under way imme-

diately, we would assume that the first reactors installed would be of the pressurized-water variety. Further into the future, we feel that the boiling water reactor and the organic moderated reactor should be considered as part of the overall development program. Since it is our understanding that only reactors which have proven design and operation will be sold under the program, it would appear to us that another year or two will be required to prove out sufficiently both the boiling-water reactor and the organic moderated reactor. Naturally, a complete review of the advantages and the extent of developments in reactor design and operation within this country during the next few years should dictate what type of reactors might best suit the needs of Euratom during the latter part of your proposed program.

5. We are unable to comment on the phasing or scheduling of the projects without having more information available to us. Suffice it to say that we feel that the limiting date of 1963 for completion of these plants is reasonable, provided the initial phases of design and procurement can be undertaken within the next year.

6. The cost estimate mentioned of $350 per kilowatt (exclusive of fuel) seems conservative but, on the other hand, for the purpose intended we believe it to be a realistic figure.

7. If guaranty by the United States Government of fuel-element performance is a prerequisite to the success of the proposal, then we agree that the Government should make such a guaranty. We recognize that considerable thought has been given to the guaranteed fuel-cycle cost and feel sure that you appreciate that the program, as proposed, will represent considerable expense to the United States through essentially subsidizing the fuel cost in the program. We are not in favor of the United States Government underwriting the fuel cost of the program for an unlimited amount of time. Technological advances which will improve fuel-cycle efficiency are to be expected, and should reduce the cost of this underwriting. However, it is to be hoped that somewhere along the line a more realistic approach to the fuel-cycle cost can be developed. No consideration has been given here to what advantages accrue to the United States over and above the processing, per se, of the fuel elements.

8. We feel that currently published information on AEC fuel-reprocessing costs is adequate for normal business negotiations in connection with the Euratom program.

9. We believe the impact of this program will augment and stimulate our domestic efforts. The greater utilization of United States reactors, components, and fuel elements is expected to be beneficial to the United States technology and economy.

10. Since the program allows for the reprocessing of fuel from other than United States sources, we draw your attention to the published reprocessing cost, which we deem to be low. By reprocessing fuel from foreign manufacturers, the program will, in essence, subsidize said manufacturers. We assume that you have evaluated this point and have decided in favor of it as being necessary to the success of the program.

We hope that the information presented above will be of assistance to you. Naturally, we would have liked to have had more time to prepare answers to the points listed in your letter, as they warrant more thorough study than we were able to give them.

We appreciate your inquiry, and trust you will feel free to communicate with us if we can help you further.

Very truly yours,

J. S. FLUOR, *President.*

FOSTER WHEELER CORP.,
New York, N. Y., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: We attach our comments on the material relating to the proposed arrangement with Euratom which you requested in your letter of June 28, 1958.

We wish to thank you for the opportunity to participate in these matters and hope our comments will be of assistance to the committee.

Very truly yours,

FOSTER WHEELER CORP.,
JOHN CARTINHOUR,
Manager and Chief Engineer, Nuclear Energy Department.

COMMENTS ON PROPOSED AGREEMENT WITH EURATOM

1. We believe the major provisions of the proposed agreement will provide a great impetus toward the peaceful utilization of atomic power. The program outlined we believe will greatly hasten the development of practical know-how so that the benefits of ensuing advances in reactor technology can be widely and quickly realized.

2. The specific types of United States assistance provided for in the proposed arrangement appear to us well thought out. In particular we regard the provisions for research and development to be of prime importance.

3. Some delays doubtless will occur in such areas as safety-guard requirements, material standards, and third-party-liability insurance. These we believe will not prove serious.

4. We believe the choice of reactor types contemplated in the agreement is generally wise in view of the time scale of the proposed program. We feel moreover that the program should be flexible enough to permit heavy-water moderation with various coolants to be included provided they can meet time schedules.

5. The limiting date of 1963 for completion of construction seems to us to be acceptable. In view, however, of the possibility of important technological developments occurring within the next 3 years it may be desirable to include a means for relaxing the 1963 limit.

6. The cost estimate of $350 per kilowatt seems to be in line with current experience.

7. Ordinarily we would not favor a system wherein the United States Government guarantees fuel-element performance. However, in the case at hand the intent of the Government is to provide a subsidy for operation of the reactors in addition to a subsidy for design and construction. Payments simply related to fuel utilization probably are the most workable means providing an appropriate subsidy for operations.

A possible drawback of the arrangements to buy back plutonium would arise in the case of heavy-water-moderated reactors. From a longer term point of view an important objective should be utilization of U–238 by means of heavy-water moderation that enables high conversion ratios to be achieved, thus resulting in higher rates of production of plutonium. But this imposes an obligation to burn the additional plutonium and in turn to develop reactors suitable for this purpose.

8. Some information will be necessary to supplement that published on AEC reprocessing cost. But this consists mainly of details that can be worked out under the broad provisions contemplated.

9. This program we anticipate will give a big lift to reactor-design development, and will hasten the realization on the wide scale of further advances in technology.

The provisions for making available to American industry promptly the technical information developed are highly important. Much would seem to us to depend on administration of the program, once intent and authorization are made definite.

GENERAL ELECTRIC CO.,
Schenectady, N. Y., July 11, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
House of Representatives, Washington, D. C.

DEAR CHAIRMAN DURHAM: The following are our comments on the nine questions raised in your June 30 letter concerning the proposed program for cooperation with Euratom in nuclear power development:

1. We endorse the general approach of the proposed program. It appears responsive to the principal problems confronting United States participation in a European reactor program, with the exception of the third party lia-

bility question. Although certain problems must be worked out to insure satisfactory working of the program, we believe that the broad concept is one which merits the support of our company and of United States industry.

One of the objectives of the proposed program is to accelerate the growth of the nuclear industry in the Euratom countries. By enabling Euratom to develop its own industrial capacity more quickly than would be the case without American aid, the period of time in which American-built reactor equipment can be sold in Europe will undoubtedly be reduced.

2. We believe that the joint research-and-development program, the $135 million loan for reactor construction, and the commitments regarding availability of special nuclear material, chemical reprocessing services, and plutonium buy-back represent desirable types of United States assistance. We have no suggestions for types of assistance, other than those included in the proposed program.

3. Certain commercial problems may arise as a result of the types of assistance proposed. Such problems were discussed at a meeting with industry representatives held by the Atomic Energy Commission on July 8. The Commission representatives took a constructive approach at the July 8 meeting, and we were encouraged to hope that the Commission will play its part in administering the Euratom program so as to solve these problems. Among the problems discussed at the July 8 meeting were the following:

(*a*) One of the objectives of the proposed program is to encourage private industry in the United States to assist private companies in the Euratom countries to engage in the atomic business. The traditional method for extending such assistance is through technical exchange and licensing agreements. It should be recognized, however, that the provisions in the proposed program relating to the transmission of nuclear know-how by the AEC *directly* to Euratom may have an adverse effect on the development of private technical exchange agreements. We recommend that Congress make clear its intent that the technical assistance should be administered with recognition of the potential impact on commercial relationships. This would be consistent with the premises of the Atomic Energy Act of 1954.

(*b*) The provisions in the proposed program covering the availability of information do not deal explicitly with the rights to proprietary data which American industry has developed with its own funds. The importance of providing protection for privately developed manufacturing know-how, in particular, was stressed at the July 8 meeting. Industry should receive reassurance that such proprietary information will be protected. Competition will be enhanced to the extent that private industry can retain rights to information developed with its own funds.

(*c*) While the procedures for administering the Euratom program are not yet clearly defined, the Commission's representatives indicated that American companies are expected to deal with European utility customers in accordance with conventional commercial practices. We feel that it is of utmost importance that the Euratom program be administered in such a fashion as to give maximum freedom for normal commercial negotiation. As will be noted in response to question 7, certain aspects of the proposed fuel guaranty program present difficult problems of reconciling commercial practices with the operation of a Government program.

(*d*) We were gratified to learn that it was the plan of the Commission to administer the American phase of the joint research and development program in such a manner as to give private companies in the United States maximum opportunity to carry on the work.

4. To meet the objective of completing 1 million kilowatts in large nuclear plants by the end of 1963, light-water cooled and moderated reactors provide the only practical course. We believe that other types of reactors should be reserved for later programs.

5. Assuming that contracts for construction can be executed in 1959, we feel that the objective of completing construction for 1 million kilowatts by 1963 is attainable.

6. In our judgment the cost estimate of $350 a kilowatt, exclusive of fuel, is realistic.

7. The fuel-cycle guaranty program consists in effect of five elements:
(*a*) The commitment for the availability of special nuclear material;
(*b*) The ceiling on fuel element fabrication costs;
(*c*) The guarantee of a minimum fuel element irradiation life;
(*d*) The commitment to perform chemical reprocessing services; and
(*e*) The commitment to buy back plutonium.

It seems clear that only the United States Government can provide commitments regarding the availability of special nuclear material, chemical reprocessing, and plutonium buy-back. All three commitments are almost certainly necessary to encourage European utilities to buy American reactors.

It seems clear that European customers also desire some guaranties of fuel-element-fabrication costs and of irradiation life. Attachment A to the memorandum of understanding indicates that American fuel manufacturers may be able to meet the fabrication charges and the irradiation-warranty levels which are contemplated by the program. This, of course, would be the ideal solution.

In the event satisfactory commercial irradiation warranties and fabrication charges are not forthcoming, it is indicated that the AEC will underwrite fabrication charges, irradiation warranties, or both. Neither the standard for determining whether commercial warranties are satisfactory, nor the exact nature of the United States guaranty is fully developed in the available documents.

In ordinary commercial contracts, a warranty provision has two essential features: First, a statement of what the manufacturer promises the equipment will do and, second, a statement of what the manufacturer's obligation is (say, repair and replacement) if the promise is not met. The second feature relating to remedies is obviously of crucial importance. The available documents do not clearly address themselves to this fact or to the practical difficulties involved in having the United States Government evaluate the total business effect of a private fuel fabricator's warranty. Moreover, the papers do not discuss the difficult practical problems, particularly in the fuel area, in determining whether a warranty has been met. In commercial transactions, these matters are worked out between the parties. The intervention of the Government may complicate matters considerably.

We believe that in reviewing this part of the program, it would be desirable to consider the following specific questions:

What effect will a commitment by the United States Government to underwrite commercial warranties have on the willingness of the fuel fabricator and the reactor owner to assume risks and thereby minimize the extent of United States Government liability?

What is the effect on industry's ability to negotiate a commercial warranty with the conventional limitations on the manufacturer's obligations, if it appears that a governmental guaranty which may not be subject to the conventional limitations is available?

What will be the respective obligations of the United States Government, the fuel fabricator and the utility in the event of a fuel failure?

How will the line be drawn between failures due to manufacturing errors and failures due to improper operations?

How will disputes be resolved?

Is it clear that commercial fuel warranties and fabrication charges are not satisfactory and that Government guaranties are really necessary?

In view of the amounts of money which may be involved in this part of the program, we feel that the particulars of such guaranties deserve full examination. The available documents do not enable us to make a satisfactory evaluation, hence the above questions, and our lack of answers to them.

8. It would appear that the AEC schedule of reprocessing charges is adequate in connection with the Euratom program because it was accepted by Euratom as a part of the proposed program.

9. We believe that the proposed Euratom program is broadly favorable to the progress of the domestic reactor program, particularly if some of the problems mentioned herein are satisfactorily resolved. It should be recognized, however, that the technical problems of importance to the Euratom countries are in some respects different from those of importance to the United States. The solution to many problems is, of course, of im-

portance both to Euratom and to the United States. It is important particularly in connection with the planning of the research and development program to keep the differences in mind. We feel certain that the area of joint interest is sufficiently great so that with the proper planning and coordination the results of the program will be of substantial value to the United States. The statements made by the Commission representatives at the July 8 meeting regarding their plans for the administration of the research and development program were encouraging.

These answers to the questions in your letter represent endorsement generally on the part of General Electric of the plan for cooperating with Euratom. We should like, however, to invite your attention to these additional matters.

First.—The proposed program includes a $135 million loan from the Export-Import Bank to Euratom. It is contemplated that these funds will be re-lent by Euratom to European utilities participating in the reactor-construction program. While the development of Euratom is a major objective of the proposed program, we believe that consideration should be given to the objective of affording opportunities for development to the nuclear industry in the United States. To accomplish this latter objective we suggest that provision be made to assure the placement of orders for nuclear equipment and services with United States firms, at least to an extent corresponding to the total of United States dollar loans to be made available under the plan. Without such assurance and in the absence of definitive language relating to this important point, we are concerned that these United States dollar funds may be used for some other purpose in the program.

In our view, the essential purpose of United States dollar financing is to assure the success of the program by encouraging the participation of United States industry in this noteworthy cooperative effort. We submit that this objective can most readily be accomplished by having the allocation of United States dollar funds to qualified Euratom beneficiaries made pursuant to the Export-Import Bank's normal procedures which have made the implementation of United States aid programs in the conventional power field so effective.

Second.—It should be recognized that a satisfactory solution to the problem of liability for nuclear hazards is an indispensable part of the Euratom program. The nature of the liability problem is clearly set forth in Working Paper VI of the Joint United States and Euratom Working Party. The great urgency of obtaining a satisfactory solution to this problem should be emphasized. The time schedule for the construction of the million kilowatt of plants is extremely tight. The schedule can only be met if United States manufacturers enter into contracts no later than 1959. We seriously question whether a responsible American business could make a contract and undertake work before a satisfactory solution to the liability problem has been developed, unless the contract provided that failing such a solution, the manufacturer would not be obligated to make delivery and would be made whole for the costs it had incurred.

Unless the liability problem is satisfactorily solved by the time contracts are ready for execution, firm commitments consistent with the 1963 operation schedule may not be possible. Hence, the problem is one requiring solution in 1959, not 1963.

The conclusions reached in this letter are necessarily of a tentative nature. Your letter recognizes the volume and complexity of the documents describing the Euratom program, and the limited time which has been available for study and evaluation.

We appreciate the opportunity you have afforded to present our views.

Sincerely yours,

FRANCIS K. MCCUNE.

GENERAL ELECTRIC CO.,
IRRADIATION PROCESSING DEPARTMENT,
HANFORD ATOMIC PRODUCTS OPERATION,
Richland, Wash., July 9, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: This is in reply to your letter of June 28, 1958, in which you request my comments on the proposed agreement with the European Atomic Energy Community submitted by the President to the Congress on June 23, 1958.

My replies to the specific questions posed in your letter are as follows:

1. Yes; I believe that, on the whole, the proposed arrangement is indeed a good one. The major provisions have my enthusiastic support. The main arguments in favor of the plan are presented in the President's message and in your letter from Mr. Strauss. I want to single out just one of these points for special emphasis, and here I refer to the need for speed, or "the growing sense of urgency." Atomic energy must be developed quickly in Europe. I strongly recommend that the joint committee approve the proposed agreement as written. Undoubtedly, solutions to many problems must be found, but I suggest that the searching and the solutions themselves be left to the Commission, to be worked out in consultation with representatives of industry within the framework of the agreement.

2 and 3. Yes; the proposed system of guaranties and incentives is a good one for the special problems presented by the European situation (but I would not agree that this is the best system for general application to the United States nuclear-power industry to stimulate the building and operation of power reactors in this country). Admittedly, any assistance plan may be criticized, and this one is no exception. Some of the problems presented are:

(*a*) The United States equipment manufacturer will be reluctant to sell a reactor to a European utility under this plan is he must turn over to the United States Government, and thus to his competitors, the knowledge and know-how gained at his own expense.

(*b*) In any reactor plant, both the fuel and reactor systems must be treated as a single complex if one is to achieve maximum progress in reducing the overall costs. The proposed system of fuel-cycle guaranties does not fully recognize this requirement, although the joint research-and-development program does.

(*c*) I anticipate difficulties in integrating the United States and European research-and-development program with the reactor design and operations improvement efforts. I see no reason why the European utility should not contract directly with United States industry for development, design, and construction; the United States concerns would then in turn be eligible to contract with the United States Government for the necessary research support. This arrangement would foster the type of followthrough attention needed to bring dividends from this program back to the United States reactor program.

(*d*) There is some question that an adequate incentive exists for both the fuel manufacturer and the foreign utility to "do the best job he knows how." (This is covered in more detail under question No. 7).

In spite of all this, I believe the proposed plan of guaranties and incentives is a good one for the special problems presented by the "assistance to Europe" program.

4. Yes, the light-water cooled and moderated reactors are certainly desirable for export abroad. No; I do not favor the inclusion of other reactor types into the agreement at this time. For one thing, even when based on a single reactor type, the complexity of the agreement is bad enough already. There might be justification for further complications if a single other reactor type were sufficiently advanced so that it could be designated as "proven"—but this is not the case. As I stated in my April 15, 1958, letter to James T. Ramey:

"The water-cooled reactor is way ahead of other competing designs in this country, and because of the industrial programs already underway, this advantage will increase rapidly during the next several years."

Furthermore, we must keep in mind that the prime objective of the program is to encourage European utilities to embark quickly upon a large-scale nuclear-power program. The assistance which the program might

provide to the United States nuclear-power industry is, in my opinion, quite incidental to this main objective. If, at this time, another reactor type were to be included, we would have to include them all. This would result in an agreement (if any) of extreme complexity and would seriously delay the job of getting the program started.

5. The limiting date of 1963 set for completion of construction seems reasonable. This would provide a little more than 5 years for the overall schedule, and gives some incentive to the European utilities to complete their business negotiations quickly.

6. Yes, the $350 per kilowatt capital-cost estimate (exclusive of fuel) is a realistic estimate for these second (or third, depending on the definition) generation plants. Price escalation during the next 5-year period will probably tend to keep the actual cost from being much lower than the estimated figure.

7. Yes, on the whole, the fuel-element guaranty is a reasonable solution to what is undeniably a complex problem. I have nothing better to propose for the Euratom agreement, but I repeat this is *not* the best system for general application to the United States nuclear-power industry to stimulate the building and operation of power reactors in this country. Incidentally, I predict that this guaranty will result in only modest costs to the United States Government, and these should be incurred only during the first few years of plant operation.

I believe the authors of the plan have attempted to establish the standard fuel-cycle cost, to be guaranteed by the United States Government, at a point where there is reasonable probability that competing manufacturers can offer a better warranty. If this develops to be the case, the proper incentives would seem to be built into the plan. The incentive to the manufacturer would be to reduce his costs and improve quality so that he could offer the best deal and thereby get the business. The incentive to the European utility is to accept the best warranty, provided he has confidence in the ability of the manufacturer; for although he is protected by guaranties insofar as fuel-cycle costs are concerned, his fixed costs and revenue *will* be affected by variations in fuel-element performance.

8. Yes; I believe they are adequate. If it develops that more information is needed, I am sure this can be provided readily by the Commission after consultation with industry representatives.

9. I should like to address myself first to the second part of this question.

Yes; I believe that adequate provisions are made for making available to American industry the information developed in the joint research and development effort. Paragraph 5, under "Incentives" in chapter IV of the working papers, deals with this subject. Incidentally, I assume that these working papers, which provide much information bearing on the intent of the agreement, will be made a part of the public record.

A vital problem is raised by your question: "What are the implications of this program for our own domestic program?" My views on this subject are covered by the following:

(*a*) The prime objective of this program is to encourage European utilities to embark quickly upon a large-scale nuclear-power program, and as such it should go forward. The assistance which the program might provide to the United States nuclear-power industry is, in my opinion, secondary to this main objective.

(*b*) There is a danger that we may expect too much return to the United States reactor-development program, and thus give too prominent a position to the Euratom program in our domestic planning for economic nuclear power.

(*c*) The proposed agreement does not, in my opinion, provide an answer to the needs of the United States nuclear-power program. In my letter to you of December 16, 1957, I stated:

"If it is accepted that our national interest, particularly in the international area, demand that the industry development go forward at a rapid pace, then the economic realities say that some form of Government support is required, for private industry alone cannot provide all of the money needed for such a program * * *. In establishing the form of subsidy, an overriding consideration is that the Government should not promote any reactor-type or fuel cycle. In other words, industry should have maximum freedom to make its own economic decisions, and the most important of these are the technical ones."

I emphasize again that, quite apart from the Euratom program, we need a different system of domestic guaranties and incentives that will stimulate the construction and operation of power reactors in the United States if we are at all serious about the attainment of economic nuclear power on an early time schedule in this country. It is still my opinion that several generations of any reactor type will have to be built and operated, and this operation supported by an extensive research and development effort before these nuclear plants can compete with the capital-cost range of large conventional stations.

In conclusion, I am sorry to see no indicated solution to the third-party liability problem. This may prove to be a serious hurdle that could well affect the desired 5-year schedule.

The above statements represent my personal opinion, based on my own experience in this field. They do not necessarily reflect the experience of other parts of General Electric Co.

Sincerely yours,

A. B. GRENINGER, *General Manager.*

GENERAL NUCLEAR ENGINEERING CORP.,
Dunedin, Fla., July 9, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: The following are my comments on the proposed arrangement with Euratom. Please understand that my comments do not represent deep study of the proposal since both the size of the document and the time available have made a careful review difficult.

My comments are keyed to the questions in your letter of June 28, 1958:

1. In principle, the plan of building some nuclear powerplants in areas of high power cost is correct; it reduces the loss, if any. As to the proposed arrangements, I do not find enough detail to see how it would operate. Apparently the plants to be built are to be chosen by Euratom and the AEC. Since Euratom has no technicians, the technical appraisal of proposed plants will fall on the AEC. It would be wise to ask the AEC now how it proposes to discharge this responsibility and also supervise the domestic program. Since the program involves the direct expenditure of United States Government funds through the guaranty of burnup, price of fuel elements, and fuel cost, the question of the customary regulations concerning competition, small business, etc., is raised but not answered.

2. The provisions which are desirable are:

(*a*) Relief of requirement of purchase of enriched uranium, with lease or time payments as a substitute. This is a very necessary and useful provision.

(*b*) Long-term loans of low-interest-rate money also is very necessary and useful. Why such favorable financing should be made available by the United States Government to the shareholders in European profit-making utility companies and not to the investors in domestic companies who also are pioneering with nuclear-energy plants is a question not pertinent to the Euratom documents.

The provisions suggested for guaranties on fuel-fabrication cost and burnup are not useful and may even harm the long-term position of nuclear power, both in Europe and in the United States. The resemblance to the United States program of farm-crop subsidies is too real for comfort.

We have a developing industry in fuel-element fabrication where competition is producing favorable costs and quite substantial guaranties. Now the United States Government is to enter the business, not directly but by guaranty of fabrication costs, burnup, and fuel cost. If the price is guaranteed, what reason is there to expect the lowest possible price? It would appear that some sort of AEC negotiation is to be substituted for the hard fact of competition.

With respect to burnup, the AEC should limit itself to a program of vigorous research and testing. Guaranteed fuel costs will not solve the burnup question; it may very well postpone the day when we will know what are practical fuel burnups. A powerplant operator who suffers no loss in removing a fuel charge at the first sign of failure will do so. We

need statistically reliable data on fuel element failure rates as a function of burnup. In my opinion, this information may be hard to get from powerplant operation, even when the powerplant operator bears the risk and cost. For a guaranteed no-loss operation, I see no hope of any useful result.

A better scheme for using the United States Government funds to subsidize fuel in nuclear energy plants for European utility companies would be the following:

> Manufacture the fuel directly in AEC-owned plants; existing installations would be able to do this. The AEC warrants fuel elements to 10,000 megawatt-days per metric ton burnup. The price to Euratom is set at the number stated in the documents or at cost to the AEC for manufacture, whichever is higher. The Euratom companies are free to buy from any United States company, but then the AEC makes no guaranty, the business being between the Euratom company and the United States company. In this way the matter is handled as a business arrangement, with the risks shared between the vendor and the customer as they should be, not by a third party, namely the United States Government, as is proposed.
>
> A further observation on guaranteed burnup may be made. In its power demonstration program, the AEC has insisted on no "open end" arrangements. All commitments on the part of the Government must be fixed in amount. The fuel-cost guaranty is as open end as it is possible for anything to be. The writer fails to appreciate the necessity for insistence for a fixed commitment for a United States utility company but an open one for a European company when the purpose is the same, namely the development of nuclear energy.

3. Immediately, all sale of United States reactors and fuel abroad will come to a halt unless the terms available to the Euratom plants also can be made available. At the very least, protracted attempts will be made to obtain the same United States Government support no matter what country is involved—and, in all fairness, why not? If the Euratom plan is approved, the same terms should be offered to all foreign plants based on United States designs. It should be borne in mind that Europe is not the only place where electricity costs more than in the United States. In fact, it costs more practically everywhere.

4. The proposal seems to contemplate only pressurized-water or boiled-water reactors; this is premature. The type should not be so clearly specified and the assistance should be available to any type which the technical experts associated with Euratom companies choose. The program should be broad enough to include natural uranium reactors or near-natural uranium reactors, heavy-water reactors, sodium-cooled reactors, organic-cooled reactors, or homogeneous reactors. As now stated, the program implies that in the United States a firm decision as to what is the best reactor type has been made. Doesn't this conflict directly with most of our domestic program statements?

5. Probably none of the Euratom reactors would be in operation by 1963. A period of at least 18 months must be counted for administrative and contractual matters. A better date would be 1965.

6. The estimate of $350 per kilowatt should be possible. No mention is made of where the Euratom administrative costs are borne. Also, the costs for the AEC participation. Should not these costs be borne by the plants they benefit?

7. As indicated earlier, an outright guaranty of fuel costs may not be to the best advantage of anyone. The progress being made in reducing fuel-fabrication costs over just the last year has been impressive. It is quite true that large orders for fuel elements would further improve the cost picture.

8. The published information on AEC fuel-reprocessing costs is not adequate. For instance, the AEC schedule gives a cost of $15,300 per day on the assumption that the throughput is 1 ton per day. In addition, there are charges for startup, cleanup, and shutdown time. These additional charges, plus some unspecified head-end treatment charges, are not as concrete or precise as would be necessary for a normal business relationship. In the Euratom papers, the fuel-processing charge seems to be based directly on the $15,300-per-day figure with no charge for startup, cleanup,

or shutdown. Normally, in computing fuel processing charges, it is necessary to allow from 20 to 50 percent extra for these charges. A schedule in which there is no uncertainty on this point would be a great help.

9. Clearly, the construction and operation of a number of large reactors based on United States designs would provide a rigorous test of our technology. It would be effective in lowering the cost of power and might actually lead to domestic competitive plants.

The provisions for making sure that American industry receives all technical information are not spelled out in sufficient detail to be certain that the satisfactory condition will prevail. As long as no American company is permitted to obtain proprietary rights as a result of participation in the program, there must be complete insistence that other companies do not obtain such rights.

As additional comments, I would say that the nuclear power costs given in Working Paper III are not sufficiently detailed in order to judge the validity of the estimates; for instance, the basis for the item on fuel inventory is not clear.

It is not clear where the interest on the money used for fabrication is placed. If the cost of the reactor is $350 per kilowatt, not including fuel, does this include the capital charge on the core fabrication? Also, quite serious is the fact that the fuel cost given is stated to be for the initial core. For tank-type reactors, there may be a very considerable penalty associated with converting the initial core to an equilibrium core. In other words, if an equilibrium core can obtain a burnup of 10,000 megawatt-days per ton average, the initial core will not do as well, and the fuel costs for the initial core will be correspondingly higher. Also, with respect to guaranteeing burnup, it would appear not to be adequate to merely guarantee the energy production of a core. The length of time the fuel element remains in the reactor may have something to do with its life, and if the operator does not choose to operate the reactor with a high load factor, some of the fuel may eventually deteriorate just due to corrosion. Any guaranty offered should place certain obligations on the operator, such as requiring fuel shifting.

Another point which is of some importance is the fact that the reactors contemplated all seem to be of quite substantial size. Nevertheless, there may be places in which smaller reactors would be appropriate. Proving the usefulness of such smaller reactors might also be important for the United States position. If the program is to be inclusive, it would appear to be worthwhile to permit it flexibility to allow inclusion of smaller reactors, which would, of necessity, have quite a different cost picture.

Yours truly,

W. H. ZINN, *President.*

GIBBS & HILL, INC.,
New York, N. Y., July 14, 1958.

JOINT COMMITTEE ON ATOMIC ENERGY,
Congress of the United States,
Washington, D. C.
(Attention: Mr. Carl T. Durham, Chairman.)

GENTLEMEN: Reference is made to your letter of June 28, 1958, requesting our comments on the proposed agreement between the Government of the United States and the European Atomic Energy Community (Euratom). The documents appended to your letter have been received by us and we are pleased to be afforded this opportunity to express our views on this matter.

The vital importance of nuclear energy as a source of power for the countries of western Europe, in the foreseeable future, is a well accepted fact. Within the next 5 to 10 years, recourse to nuclear power in these countries will become an economic necessity, the pace of which will be limited only by the volume of the incremental investment required, the cost of energy produced, and the availability of foreign exchange. Two countries of the Western World are in a position, technologically, to satisfy this growing need, the United Kingdom and the United States. British manufacturers have been offering installations at costs and with warranty provisions sufficient to assure Europeans of a net cost of energy equal to approximately 10 mills per kilowatt-hour, which is about the same costs as for energy produced by conventional fuel in western Europe. On the other hand, the estimated cost of energy generated by United States reactors is at the approximate level of 15 mills per kilowatt-hour. The United Kingdom, then, is in a much better competitive position to offer such installations, which, furthermore, are a proven satisfactory operation.

The outcome of this situation is obvious. The entire first generation of large European power stations will be British unless positive action is taken by the United States Government. Should no such action be taken, the relative competitive position of the United States with respect to the United Kingdom in 5 or 6 years will be even less favorable than at present. The British will then be in a position to display to already committed Europeans 7 or 8 years of satisfactory operation of their reactors, whereas the United States will be able to claim only 2 or 3 years' commercial operation for their installations. Further, the possibility of cost reduction of United States equipment and fuel during this critical period may not improve the United States competitive position in western Europe, since it is most likely that British evolution will be in the same direction. In our opinion, the United States is faced with two alternatives: Either to help Europe build atomic powerplants based on United States equipment and technology, and benefit from the additional experience gained; or accept an overwhelmingly British atomic-energy program in western Europe for many years to come.

In accordance with your request we are offering below our comments on the specific points itemized in your letter:

Question 1

The major provisions of the proposed arrangement can be summarized as follows:

(*a*) Long-time credits to Euratom countries by the United States to the extent of approximately 40 percent of the initial cost of the projects.

(*b*) Fuel-element-integrity guaranty, at a level of 10,000 megawatt-days per ton of contained uranium.

(*c*) Fabrication cost of fuel elements (with stainless-steel cladding) limited to $100 per kilogram of contained uranium.

(*d*) United States financial contribution for research in the order $50 million for 5 years.

Since the expressed purpose of the proposed legislation is to enhance American atomic-power generation technology in western Europe, there is no doubt that all the measures proposed are appropriate and desirable. To illustrate the relative impact of those measures on the cost of energy, the following figures are offered. These figures are based on engineering and design information developed in connection with a specific project under consideration within the Euratom program.

Estimated cost of energy based on present conditions

	Mills per kilowatt-hour
Fixed charges	8.
Fuel cost under present conditions	6.21
Operating charges	1.
Total	15.21

The reductions in cost of energy corresponding to the various provisions listed above are estimated as follows:

(*a*) *Credit facilities.*—The cost of energy computed above has been based on the availability of such credits.

(*b*) *Fuel-element integrity guaranty at 10,000 megawatt-days per ton.*—This guaranty is slightly more favorable than that offered by American manufacturers at the present time. The reduction in cost of energy deriving from this guaranty will be approximately 0.5 mill per kilowatt-hour.

(*c*) *Fuel-element fabrication.*—The limitation of cost of fabrication to approximately $100 per kilogram is substantially lower than the cost offered by American manufacturers at the present time. The reduction of cost of energy deriving from this limitation will be in the order of 0.9 mill per kilowatt-hour.

(*d*) *Research contribution.*—Does it not appear that the reduction in cost of energy deriving from the provisions of (*b*) and (*c*) above is entirely insufficient to stimulate nuclear-power generation in Europe? The research contribution may thus become the deciding factor offered to European utility organizations. The arrangement proposed provides for a $50 million fund for a period of 5 years. If this contribution is made available directly to the utilities, and not to Euratom, it will be equal to approximately

1.6 mills per kilowatt-hour. Assuming that a portion of this amount will actually be spent on research, there could be a net contribution of 1 mill per kilowatt-hour.

On this basis, the total reduction in cost of energy will be as follows:

	Mills per kilowatt-hour
Fuel-efficiency guaranty	0.5
Core fabrication	.9
Research contribution	1.0
Total reduction	**2.4**

Therefore, the cost of energy could be reduced from 15.21 to 12.8 mills per kilowatt-hour. It will be recalled that the cost of energy from conventional fuel in western European countries is approximately *10 mills per kilowatt-hour*. It will be noted, therefore, that the benefits under consideration will not reduce the cost of atomic power to a competitive level. It is felt, however, that these benefits will assist materially in making atomic power generated by United States-built reactors acceptable to European utility organizations and more competitive with British reactors. In this respect the research contribution may have a deciding effect, provided it is paid directly to the utilities in United States dollars. It will be noted that the total annual amount of the contribution is approximaely equal to the annual interest and amortization payments to the Export-Import Bank for the investment loan.

It may be deemed desirable to retain the research contribution for research purposes, in which case it would appear necessary to develop some other means of subsidy in approximately the same amount if the American nuclear-power industry is to participate in the program.

Question 2

The specific types of United States assistance provided in the arrangement as listed above are certainly desirable. There are, of course, other types of assistance which could accomplish the same result, among them the increase of the repurchase price of plutonium, waiver of use charge for fuel inventory, etc. In order to bring the cost of energy closer to the cost of conventional energy in Western Europe, additional benefits would be required.

Question 3

No serious problems with regard to sale of United States reactors and fuel elements abroad under the arrangements proposed are apparent. It is assumed that the guaranties offered under these arrangements will be made through the manufacturers, and not directly to the end users, in order to avoid triangular contractual relationships.

Question 4

Light water cooled and moderated reactors are the only proven types available on the American market at the present time. No unproven design should be made available for export, at the risk of defeating the purpose of the proposed legislation.

Question 5

A 5-year completion schedule for the Euratom program seems to be reasonable, provided no delay is experienced in the implemention of the program. Based on actual experience with a similar project, it would take between 18 and 24 months for the development of the preliminary engineering, issuing specifications, obtaining bids, and preparation of contracts. This would leave between 3 and 3½ years for actual construction, which is not too long for a nuclear powerplant. Of course, projects on which preliminary engineering has been completed and procurement contracts placed have a better chance to be in actual operation by the limiting date. This is the case of project Enrico Fermi, in Italy, whose procurement contracts are signed and ready to take effect automatically upon passage of satisfactory legislation.

Question 6

For projects in the 150- to 200-electrical-megawatt capacity range, an estimated cost of $350 per kilowatt of gross capacity is reasonable for construction in Europe.

Question 7

Whatever mental reservations we may have, on the basis of the idealogical principles, against the United States Government underwriting fuel costs of electric utilities in general, it would appear that the only alternative available, within the scope of the proposed legislation, is to subsidize the cost of equipment. This will reduce the fixed charges and thereby the cost of energy. In other words, it being in the interest of the United States Government to promote the use of American equipment and the development of American atomic-power technique in Europe, there is no choice outside of Government subsidy in one form or another.

Question 8

The published information of AEC fuel-reprocessing cost is adequate. It is felt, however, that the fuel costs themselves may have to be made more favorable, as explained in the comments on question 2.

Question 9

The implication of this program for our own domestic program is that this country will derive long-range benefits through participation of American manufacturers of atomic-energy power equipment and from technical contributions made by European engineers and scientists during the course of development and operation of the projects under the program. Furthermore, there is a every reason to believe that lower costs will be one of the benefits deriving from large-scale activities in the field. The provisions to that effect seem to be adequate.

We thank you for this opportunity to express our views, and hope they will be helpful in your consideration of the proposed legislation.

Very truly yours,

DAVID B. SLOAN, *President.*

GILBERT ASSOCIATES, INC.,
Reading, Pa., July 10, 1958.

Re Euratom agreement.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: We offer the following comments in regard to the Euratom agreement, outlined in the same form as presented in your letter of June 30, 1958.

1. We agree with the general approach and major provisions of the proposed legislation as appropriate for our program abroad with one comment. Will this sort of assistance be made available on a broader scale? That is, will it be limited to the six Euratom nations or be extended in similar fashion to other non-Communist nations throughout the world? This legislation is excellent but should not be the limit of our nuclear program abroad.

2. The setting aside of $135 million for Export-Import Bank loans, the technical assistance, and the fuel guaranties are highly desirable. We question, however, the need to supply $50 million in research and development if the program is limited to the highly developed types, namely the PWR and BWR concepts. We suggest no other types of assistance than those already covered.

3. The assistance provided should clear away all serious problems we have encountered to date in developing a United States reactor market abroad, particularly with firm fuel and plutonium buyback commitments and the provision to have plutonium returned used only for peaceful purposes.

4. The types of reactor proposed are in our opinion, the only ones desirable for export if such installations are to provide firm, reliable power during the next 5 years. If the Euratom group is willing to take a less conservative approach, other types show promise. These less developed types include the sodium graphite concept and the gas-cooled types both offering higher thermal efficiencies and the heavy-water types offering better fuel economy at lower enrichments.

5. The timing of the projects is realistic if installations are limited to the highly developed water types.

6. In our opinion, the cost estimates of $350 per kilowatt are slightly optimistic based on past experience. The figure may be representative, however, based on duplication of existing designs in the size range of 125 to 150 megawatts.

7. Guaranteeing fuel-element performance is desirable from the standpoint of meeting world competition. This should not be overdone, however, as it distracts from a natural incentive for improvement.

8. No opinion.

9. Increased production of nuclear-plant components and fuel elements will reduce manufacturing and fabrication costs and thus benefit our domestic program. Plants built here or abroad will increase knowledge and experience. The conveyance of information from plants operating in Europe may be less conveniently available but remains a worthy contribution.

Additional comment.—While the fuel subsidy appears theoretically sound, the problem of making the burnup guaranty workable is formidable as many of the factors influencing core life are subject to varying degrees of responsibility and control between the core designer, the fuel fabricator, and the operating utility. In practice, it may be very difficult to establish a set of standards for determining an equitable basis for these guaranties.

Thank you for the opportunity to express our views on the proposed program.

Yours very truly,

J. R. STOUDT,
Manager, Nuclear Energy Division.

THE H. K. FERGUSON CO. INC.,
Cleveland, Ohio, July 16, 1958.

Mr. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Committee of the United States, Washington, D. C.

DEAR MR. DURHAM: As we see the proposed Euratom program of the President, it calls for the start of construction within the next 2 years of 6 or 7 nuclear powerplants of proven design. This we interpret to mean either pressurized water or boiling water with the possibility that an organic-moderator type might be added late in the program. These plants would be finished by European utilities up to the cost of similar fossil-fueled plants, with the excess cost covered by a United States loan of $135 million plus other European financing. To insure reasonable fuel costs the USAEC would guarantee that fuel-fabrication costs would not exceed certain limits and that fuel burnup would be at least 10,000 megawatts per day. A research-and-development program designed to reduce fuel costs on these reactors would be jointly supported by the United States and Euratom.

As architect-engineers and constructors of nuclear facilities, we believe that a short-range program of this type designed to build 1 million kilowatts of proven types of nuclear powerplants in Europe where power costs are high relative to the United States, and where power needs are increasing rapidly, is good engineering and good business for both Europe and the United States.

From an industry standpoint, we believe the plan to be a feasible one for the foreign market today. As engineers and builders we believe we could operate successfully under it. We would like to see the third-party liability abroad solved as well as it has been in the United States, but we cannot suggest any solution superior to that set forth in the agreement considering the political realities. We firmly believe that only proven reactor types should be exported. The place for prototype reactors is the United States. Reliable operating nuclear powerplants are the only sound export products.

The cost figure of $350 per kilowatt exclusive of fuel is strict, but we believe it to be attainable today. Here again we are talking of proven design, where a major effort can go into capital-cost reduction. Capital-cost reduction must be a major goal if economic power is to be obtained.

The effectiveness of the fuel-element guaranty will depend in large measure on the administration of the guaranty. We presume a ceiling will be placed on this subsidy to encourage sound administration. Here again if economic power is to be obtained, costs must be reduced to the point where the guaranties will no longer be needed. If this subsidy operates as the airmail subsidy did, it should be successful.

The cost of reprocessing spent fuel elements will need to be more definite. We would hope that between the time that a fuel-element design is frozen and the reactor starts to operate precise fuel reprocessing costs for that particular element could be established by the Atomic Energy Commission, and that every effort will be made to have privately owned fuel-element-reprocessing facilities competing for this business.

In summary, we feel that with wise administration the proposed Euratom program is workable, and would greatly hasten the day of economic nuclear power in the United States. A sound program of this type would put the United States atomic industry in a very strong position in the world power market.

Sincerely,

EDWARD L. HELLER,
Chief Engineer for Nuclear Projects.

INTERNUCLEAR CO.,
Clayton, Mo., July 14, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR CONGRESSMAN DURHAM: Thank you for your letter of June 28 asking us to comment on the proposed international agreement with Euratom.

Specifically, our views are as follows:

1. First of all, we are in accord with the major provisions of the program. Working as we have with Società Elettronucleare Nazionale in Italy and with Nuclenor in Spain, we recognize the need to get the atomic-power program moving in Europe.

2. In general, the specific types of assistance provided for are desirable. I believe, however, that in the Euratom countries there is a strong desire to accomplish as much as possible with each country's own industrial and technical capabilities. We should, therefore, offer technical assistance from the United States Atomic Energy Commission only where there is not available on a commercial basis either in the Euratom country or in the United States. Such assistance commercially available in the United States of America and perhaps in the Euratom countries is offered in appendix C, No. 2, Selection and Evaluation of Reactor Concepts. Of course, we recognize the United States Atomic Energy Commission should have the right to approve the project, but I believe the selection and evaluation should be left to the eventual owner of the plant. Again in appendix C, No. 5, the United States Atomic Energy Commission agrees to offer technical advice in regard to chemical processing which may be readily available on a commercial basis either in the United States or in the Euratom country itself.

3. The types of assistance provided for certainly help the manufacturer in selling his product abroad. However, offers of United States Atomic Energy Commission technical assistance can interfere with private sale of engineering design and consulting services.

4. It seems that the program should include organic-moderated reactors and gas-cooled reactors as well as the BWR and PWR types listed. In limiting the types to PWR and BWR, Congress would in effect be saying these are the only types feasible for construction and operation in the 1959–63 period. This decision should, I believe, be left to the eventual owner of the plant. Of course, the United States Atomic Energy Commission should have the right of approval of his decision.

5. Our experience in Italy has shown that 9 to 12 months are required for preparation of tenders and evaluation of bids before a reactor contractor can be chosen. Following this, perhaps 4 years are required for design, construction, and test operation. To us the limiting date of 1963 should be extended by at least 1 year in order to allow the selection and design to proceed in an orderly economic manner.

6. The cost estimate of $350 per kilowatt is certainly adequate as indicated by our experience in Italy. This is especially true if as much of the equipment and plant as possible is purchased locally.

7. In order for a reactor owner to see his way clear to purchase a reactor, he must have reasonable assurance as to fuel costs. The fuel cost and performance guaranties suggested seem to be a reasonable way of achieving this requirement.

8. The published information on fuel-reprocessing costs seems adequate for normal business relations.

9. The provisions of the agreement seem adequate for making available to all interested parties the technical information developed under this program.

In general, this program seems extremely desirable, especially if private enterprise is emphasized throughout.

If there is any further information I can furnish you, please call on me.

Sincerely yours,

PHILIP N. POWERS, *President.*

J. A. JONES CONSTRUCTION CO.,
Charlotte, N. C., July 29, 1958.

Mr. JAMES T. RAMEY,
Executive Director, Joint Committee on Atomic Energy,
Washington, D. C.

DEAR MR. RAMEY: In answer to your inquiry about the proposed Euratom agreement for cooperation in nuclear-power development, I will try to answer as specifically as per your questions:

1. Yes.
2. Yes.
3. No—except the possible use of fuel elements for war purposes. International agreements can become scraps of paper in the twinkling of an eye.
4. Yes, and any other types which may be developed subsequent to this date.
5. The phasing and scheduling, certainly, should be expedited in every way possible so as to decrease the dependence of the west European countries on Middle East fuel.
6. The cost estimate is certainly low enough.
7. To our way of thinking, the Euratom countries should pay a realistic price as a rental on the fuel elements, just as they would buy coal and oil from us.
8. Yes.
9. This might speed up our own domestic program by actual demonstration of what can be done with nuclear power.

Sincerely yours,

EDWIN L. JONES, *President.*

JACKSON & MORELAND., INC.,
Boston, Mass., July 14, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of United States, Washington, D. C.

DEAR MR. DURHAM: We have reviewed your letter of June 30, 1958, and the enclosed material relating to the proposed agreement with Euratom for cooperation in nuclear-power development under sections 123 and 124 of the Atomic Energy Act of 1954. In accordance with your request, we would like to submit the following answers to the specific questions raised in your letters:

1. In general, it appears that the approach and major provisions of the proposed arrangement are very appropriate for our atomic program abroad. There are some modifications, however, which we believe might result in a more successful foreign atomic program. The major points are outlined in our answers to the other questions.

2. The specific types of United States assistance in the proposed arrangement are desirable. In our opinion, the major emphasis appears to be on the United States manufacture of the fuel elements only. This is to be done either in the United States or under licenses negotiated with foreign manufacturers. Because the utilization and performance of the fuel element depends to a major extent upon the detailed reactor design, it might be more appropriate to have the entire reactor system supplied by United States manufacturers or at least, as has been stressed, designed in collaboration with United States scientific and engineering representatives.

3. In view of our answer to question 2, we believe that the type of assistance provided could pose technical and industrial problems in the sale of the fuel elements abroad unless a completely coordinated reactor system is assured for each of the plants to be selected. It will be difficult to guarantee fuel-element performance in a situation where the design of the reactor-core and heat-removal system is carried out by a supplier who is not at the same time responsible for meeting the guaranteed fuel-element-performance characteristics.

4. Pressurized-water or boiling-water reactor types are desirable for export abroad. Limiting consideration to these types, as contemplated, should provide the maximum assurance of an accurate prediction of cost and performance with a minimum amount of development. This assurance of cost and performance is necessary where electric-system plans may be

upset if a prolonged period of development is involved in order to bring the plants into successful operation. We would, therefore, suggest that no other types of reactors be considered for this program, until successful operation is demonstrated on a large scale in the United States.

5. The schedule of completing construction by 1963 may be extremely difficult to meet in view of the major problems to be solved regarding third-party liability, and the coordination and purchase of the many components, partly from the United States and partly from European manufacturers. Designs for specific locations must be completed, hazards evaluated, and appropriate financing obtained. The goal of completing six reactor systems in Europe by 1963, therefore, appears to us to be somewhat unrealistic. We believe that the best chance of realizing the proposed schedule is to repeat existing plant designs such as Dresden or Yankee, with only minor appropriate modifications.

6. We believe the cost estimate of $350 per kilowatt for construction of 150- to 200-megawatt plants, exclusive of the fuel cost, to be reasonable.

7. Where the United States not only guarantees fuel-element performance but also underwrites the fuel cost including the fixed-charge components, the liability of the United States depends upon the load factor achieved in operation. It appears that a load factor of 80 percent has been used in calculating typical examples of cost. We believe that this value may be considerably higher than that which will be realized over the useful life of the plant. However, economic incentives will be probably in the direction to make the load factor as high as possible, so the objection to using a high load factor in calculating the standard fuel-cycle cost will tend to be minimized.

In general, the proposed system with respect to the fuel guaranty is desirable, while at the same time this method tacitly underwrites the attainment of a specific plant-load factor, which may not be realized due to circumstances other than fuel-element performance.

8. The AEC fuel-reprocessing information on costs should be adequate for successful business negotiations in connection with the Euratom program.

9. As presently outlined, we believe that the proposed plans imply that the major contribution of United States manufacturers will lie in the supply of fuel elements. A great deal of technical assistance will, however, be required to complete satisfactory plant designs. While the approach is to use the best known technology presently available, little hardware other than the fuel elements would be supplied by the United States. This means that there will be little effect toward increasing the capability of United States industry to produce essential reactor components. We believe that there are adequate provisions for making available to American industry the technical information which might be developed in the joint research-and-development program.

Thank you very much for the opportunity to review and comment on this program for the peaceful uses of atomic energy.

Very truly yours,

JOHN R. COFFIN.

KAISER ENGINEERS,
DIVISION OF HENRY J. KAISER CO.,
Oakland, Calif., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: Mr. Bedford is out of town and I have been requested to reply to your letter of June 28 concerning the proposed agreement with Euratom for cooperation in nuclear-power development.

Our comments are expressed in the same sequence as the questions in your letter:

1. Yes.
2. Yes.
3. No.
4. The types of reactors contemplated in this agreement are deisrable for export abroad. In addition, we believe that within the next year sufficient advancement will be realized with respect to the gas-cooled graphite-moderated enriched fuel reactor and the organic-moderated reactor concepts to

warrant consideration of their inclusion in this program. There are certain specific requirements and conditions which might favor the use of one or the other of these latter reactor types and the United States nuclear industry should be sufficiently diversified to meet all possible needs within the Euratom objectives.

5. The *limiting* date of 1963, for completion of all six large nuclear-power projects, may be too inflexible or restrictive when considering the sequence of events which must transpire before a project is actually initiated. It is reasonable to assume that a project, which is sufficiently advanced so that work can be started within this calendar year, may be completed by 1963. However, allowances must be made for the time required to implement the proposed United States-Euratom agreement, establish and scope the projects which fall within this agreement, solliet proposals or bids, select contractors, and negotiate contracts, before detailed design, procurement, and construction can begin; 1965 might be a more reasonable time limit, or provisions might be incorporated into the agreement permitting more time latitude where justified.

6. Yes.

7. Yes; if we are to be able to compete with non-United States contractor consortio whose governments are providing similar subsidies.

8. Yes.

9. This program should expand our own domestic nuclear industry by providing a market for nuclear engineering services and nuclear components to which is not being realized in this country as rapidly as many manufacturers had originally predicted. There has been insufficient income-producing nuclear work in this country to enable many of our nuclear manufacturers to sustain the financial involvement in maintaining the extensive nuclear manufacturing capability which they have developed.

We believe there are adequate provisions for making available to American industry the technical information developed in this proposed joint effort.

The only other comments we might offer at this time is that it is extremely important that this agreement and all of the provisions herein be effected with a minimum of delay. At the present time and with considerable investment, a number of United States engineering and manufacturing companies have nuclear-power-reactor proposals in Europe pending evaluation or negotiations competitive with proposals from British consortia. It is recognized that the British Government is providing a form of subsidization relative to fuel costs and warranties in the British proposals. We understand that this subsidy permits a significant differential between the fuel-cycle costs offered by the UKAEA, via the proposing British consortia, and those costs which must be offered by United States proposers without assuming appreciable risk. Eventually, as we gain more technological experience, American physicists, engineers, and manufacturers will develop cores of higher efficiency and longer life than those available today and eventually United States manufacturers will be capable of competing in the foreign nuclear market without any form of United States Government subsidy. Meanwhile, we need Government assistance and cooperation if our nuclear industry is to expand beyond the confines of our own domestic program.

Thank you for giving Kaiser Engineers this opportunity to express our opinion in this very important matter.

Very truly yours,

PATRICK J. SELAK,
Manager, Nuclear Engineering Development.

[Telegram]

WASHINGTON, D. C., *July 15, 1958.*

JOINT COMMITTEE ON ATOMIC ENERGY,
Congress of the United States, Washington, D. C.:

For James T. Ramey from D. B. Hall. I apologize for not answering your letters regarding Euratom proposal before this. However, the questions that were asked in the letter are, in general, in the areas of industrial practices and policies of state and, as such, are outside my personal knowledge. Therefore, I respectfully ask to be excused from formal evaluation and comment of the proposed Euratom arrangement.

LOS ALAMOS SCIENTIFIC LABORATORY,
Los Alamos, N. Mex.

NUCLEAR DEVELOPMENT CORPORATION OF AMERICA,
White Plains, N. Y., July 9, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. CHAIRMAN: I fear that I am far from having digested the Euratom material, but will attempt to reply to your questions as best I can.

1. Yes.
2. Yes; for the reactor types (H-moderated) intended. For other types, which may show lower fuel costs and higher or more uncertain capital costs, assistance on the latter might be desirable.
3. Probably will make some problems, but I do not think they should be too serious.
4. Yes; in the longer range D-moderated, unmoderated (i. e., fast breeders).
5. Probably satisfactory for the intended H types; 1963 date would need to be extended for others.
6. Possibly for H types; unsure for the others in present state of knowledge.
7. O. K. for H reactors where fuel costs are high; less useful for types with lower fuel costs.
8. Not sure, but think so.
9. Will firm up our H type industry and experience. Not sure, but think so.

Sincerely yours,

GALE YOUNG.

APPENDIX

I append here some more rambling remarks (primarily in the area of reactor types). Please feel free to retain or discard these as you see fit.

1. I am most happy to see something along the lines of the general approach being made, wherein the United States and other countries share the costs incurred and the experience gained in developing, constructing, and operating reactor powerplants. That the plants will be operated in Europe, where conventional fuel costs and supply are more pressing, is an attractive feature.

4. To be fully successful, a joint program must, of course, be responsive to the true interests of the parties involved. There are good reasons for interest in the types of reactors which are farthest along in development; such as a bona fide need for power and concern about conventional fuel supplies in Europe now, and everyone's wish to more rapidly obtain actual operation and design iteration experience.

As I understand it, it is intended to promote hydrogen-moderated reactors under this program. Since these are about the only machines that we have anywhere near ready for export, it seems reasonable to emphasize these initially.

I have tried to look at the proposed Euratom program against the background of the overall United States power-reactor program. My impression is that the Euratom program involves about 300×10^6 United States dollars (including Export-Import Bank dollars) over 10 years in all, or say an average of 30×10^6 per year. The balance of the United States program looks at the moment to be something like 170×10^6 per year, of which about 75×10^6 goes to H reactors and 95×10^6 goes to all other reactors. Thus it appears that we are looking at 200×10^6 per year, divided about evenly (105 v. 95) between H and non-H reactors. It is my impression that this is a reasonable distribution for now, if 200×10^6 annually is a reasonable total amount in the national budget and priority picture. From this point of view I would be in favor of accepting the proposed program and getting on with it. I do not believe, however, that the interests of either the United States or Europe would be best served by concentrating the entire future joint program onto the most-expedient-now reactors only. Additional reactor types should be covered in a similar joint program with construction dates a few years later than 1963.

As to what these additional types should be, I make out my best belief to say—

(*a*) D-moderated
(*b*) Unmoderated, i. e. fast breeders

in that order in time.

"Why" is always a good question at this point, partly so because there are no good answers. While I have been trying to compose this letter to you, I have been playing a little game on another sheet of paper. It is the kind of game I usually

dislike, but by playing it in a simpler form than usual it possibly become more worthwhile. In any case, for whatever it is worth, it goes like this:

The major reactor types by moderator are H, C, D, O (meaning no moderator, or fast breeder); in order of increasing merit as regards neutron economy or convension ratio or raw fuel material economy.

Let us first consider H and C by themselves. C is better than H in respect just mentioned, but poorer in that graphite reactors come out to be larger than water reactors. Detailed comparison studies often say, in effect, that these two things just cancel; i. e. that the fuel-cost saving with C just offsets the increased capital costs from the larger size. If we thus say that H and C are a standoff, and that we are ahead in H while the British are ahead in C, then it is plausible that Europe will buy its sample C reactors from England and that we should forget C for our export list.

Coming next to D, it is better than C in both reactor size and neutron economy, and thus, also, better than H=C. Also, in D we reach now a reactor type which can really operate on natural uranium; and this feature may be particularly attractive in Europe.

In the same vein, the O reactors are superior to D in both size and neutron economy, and so should ultimately be the best of all. They require, however, an industry base of concentrated fissionable material to get into operation, and perhaps also need some further technological progress in fuel elements and reprocessing. Hence one would rate them later in time, and especially so for countries which are just starting to build their nuclear industry.

One can also play the above game numerically by rating the reactor types from 1 for poorest to 4 for best in each respect, and choosing the weighting factor to make H=C as per the more detailed studies. The result is—

Type	Neutron economy	Size	Total points
H	2	3	5
C	4	1	5
D	6	2	8
O	8	4	12

One can then add columns for other aspects, such as freedom from K–25 plants, United States competitive position, degree of development, etc., and see how the totals move.

[Telegram]

WHITE PLAINS, N. Y., *July 14, 1958.*

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington, D. C.:

This is in response to your letter of June 28, 1958, regarding the proposed Euratom agreement. My answers follow in order of your questions:

1. Yes; except I call attention to omission of direct statement of basis for provision of heavy water. Not clear whether it is covered and to what extent by statement "special materials."

2. Types of assistance specified in Senator Anderson's speech of June 19, 1958, with which we agree, can also be useful and might be considered abroad.

3. One of purposes of Euratom agreement is to help develop European industry. This will encourage its development with a timely and useful, but transient, benefit to United States industry.

4. Strongly believe that heavy-water reactors are appropriate for export abroad and need to be provided for in this agreement.

5. Suggest that some room for slippage, at least to 1964, be provided.

6. Depends on extent of difference between costs and price which manufacturers are willing to absorb and degree of advancement of the art to be provided. At $350-per-kilowatt price the manufacturers' complete cost probably will not be covered. Provision should be made for some advancement of the art to protect such a large investment from becoming obsolete too quickly.

7. Yes; as an initial inducement to proceed, this is valuable. Some capital underwriting may also be worthwhile especially for advancing the art.

8. Substantially adequate, especially since some reactors burning natural uranium do not require, but only optionally use such a plant.

9. Implication to United States is transient benefit to program through provision of immediate customer before United States market is developed. As long as the principle of reciprocity in both the $50 million research and development programs proposed has been achieved, I believe a reasonable agreement has been effected at this point.

In summary, I believe this is basically a good agreement and should go forward.

NUCLEAR DEVELOPMENT CORPORATION OF AMERICA,
JOHN R. MENKE, *President.*

[Telegram]

WHITE PLAINS, N. Y., *July 15, 1958.*

CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington, D. C.

Would like to amend by July 14 wire statement to you re Euratom at two points. First, insert the following sentence between the first and second sentence of the lead-off statement: "I have had the benefit of comment from our overseas associates, NDA Europe." Second, change first sentence in item 6 to read: "Depends on extent of manufacturer's willingness to absorb the difference between costs and price and on the degree of advancement of the art to be provided."

NUCLEAR DEVELOPMENT CORPORATION OF AMERICA,
JOHN R. MENKE, *President.*

NUCLEAR METALS, INC.,
Cambridge, Mass., July 28, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SIR: We regret our long delay in replying to your letter of June 30 asking for comments with respect to the proposed agreement with Euratom submitted by the President on June 23, 1958.

We have had the pleasure of reviewing this whole proposal with the staff of the Atomic Energy Commission at their meeting on July 8, 1958, during which many of the details and problems incident to this proposed agreement were discussed.

We summarize our reactions to this proposed agreement by saying that we believe it is one which should be supported wholeheartedly by Congress. We realize that there are some problems which will have to be worked out as the program proceeds, but we think that these are of such nature that they can be resolved as the program goes along.

Very truly yours,

H. HUGH WILLIS, *President.*

NUCLEAR PRODUCTS—ERCO,
DIVISION OF ACF INDUSTRIES, INC.,
Washington, D. C., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: In reply to the specific questions in your letter of June 28, 1958:

1. I believe the general approach and provisions are appropriate.
2. I believe the type of assistance provided for is desirable.
3. I can see no serious technical or industrial problems in connection with the proposals.

4. I think it is true that the pressurized- and boiling-water reactors are the only types of reactors proven in prototype size and are, therefore, the types most likely to be purchased by Euratom countries. Since the customer will specify the type, it is perhaps unnecessary to place restriction on the type of reactor covered by the program.

5. 1963 appears to me to be early as a limiting date. 1965 would appear to provide a better time schedule for planning and construction.

6. I believe the cost estimate of $350 per kilowatt (exclusive of fuel) is realistic.

7. At the present time inadequate experience of fuel-element performance is one of the major problems facing a manufacturer required to give fuel-element guaranties. United States Government underwriting of fuel costs is, therefore, a highly constructive step. It would, however, appear appropriate that United States Government guaranties be extended only to fuel elements of approved types.

8. Published information on AEC fuel-reprocessing costs is adequate to the extent that charges are firm. However, there may be some concern in that these prices are not commercially proven.

9. The detailed arrangements for making available technical information developed in the joint research-and-development effort are not specified. I can see no reason why adequate provision could not be made.

Sincerely yours,

H. ETHERINGTON, *Vice President.*

PICKARD-WARREN-LOWE ASSOCIATES,
Washington, D. C., July 23, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR CONGRESSMAN DURHAM: Your letter of June 30, 1958, forwarded to us copies of documents relating to the recently proposed arrangement between the United States and the European Atomic Energy Community (Euratom) for a million-kilowatt power program. We welcome the opportunity to review the proposal, and to give you, herewith, comments on those aspects of the proposal where our views may be pertinent.

The sections which follow are numbered according to the related questions in your letter of inquiry.

1. From our brief review, the general approach to this million-kilowatt program seems to be desirable and well conceived.

It may be appropriate here to observe that, in our preparation of the report published by the Atomic Industrial Forum in March 1958, entitled "A Growth Survey of the Atomic Industry, 1958–68," a number of European countries were visited to review their current nuclear-power plans, and the prospects of the Euratom program. Attached to this letter are brief excerpts from section 10 of that report, which expressed our views in support of the basic need and desirability of collaboration between United States and foreign industry in the promotion of nuclear-power development for Europe.

2. The general idea of providing guaranties on fuel performance and cost seems well designed for promoting the purposes of the program. It would appear, however, that the fuel-guaranty program will, of necessity, involve many complexities and practical problems which must be worked out in detail later.

For example, situations will vary with individual plants, and standard rules and regulations will be difficult to conceive and apply uniformly. This, together with the difficulties and large uncertainties involved in measuring fuel burnup and other elements of fuel costs, will require that a flexible program, with a large measure of administrative discretion, be provided. There is hope that new operating experience may reveal practical methods for handling these questions. There is, also, some hope that improved performance in time may make the fuel guaranties self-liquidating.

Even under these favorable circumstances, the actual administration of the program will probably prove to be of controlling importance in its ultimate success. This suggests that whatever can be done through legislation to lay the basis for competent, flexible direction of the program, both here and abroad, would be of greater value than highly detailed provisions in the initial arrangements.

In considering what the Euratom countries have to gain from accumulated United States nuclear experience, it should be observed that there are many items of importance which would not be embodied in these agreements. These include such matters as:

(*a*) Knowledge of management considerations in planning nuclear reactor projects.

(*b*) Architect-engineering guidance in independent evaluation, location, layout, design, and engineering supervision of nuclear powerplants.

(*c*) Use of manufacturers' existing specialized fabricating capacity, and acquired techniques for producing special quality components for nuclear reactors.

(*d*) Practical experience in field construction practices, which will tend to reduce unusual costs of nuclear-plant construction.

It is clear enough that a fundamental purpose of the 1-million-kilowatt program is to develop experience and competence of foreign organizations in nuclear powerplant work. But it should be apparent, also, that not all of the know-how and capacity outlined above can be created in the preparation and execution of the first million kilowatts, and, at the same time, allow the program to be completed within the time schedule contemplated. Consequently, the administration of the program, and, if necessary, its legislative background, should minimize the chances that execution of this program will be "bottlenecked" by attempts to minimize unduly the use of present United States capabilities.

3. It would appear that the possibility of this program's being adopted might temporarily cause deferral of decisions on some of the major nuclear-power proposals currently pending in Western Europe. Such projects might be suspended to determine whether they could receive the benefit of the new arrangements. Consequently, an early decision for or against the program would avoid protracted deferment of these projects.

From our brief review of the proposal, there is one aspect of the patent provisions and related research and development program which may be of concern. First, let us observe, a substantial amount of research and development is clearly a necessary accompaniment to a major construction program at this stage of power-reactor development. Yet in the case of the million-kilowatt program for Euratom, with limited time available and using relatively proven systems, the principal areas in which research and development funds can be expended would be on engineering improvement of reactor components and fuel elements.

Under the circumstances, it is desirable that the planning and expenditure of research and development funds be so guided as to enlist the interest of experienced United States manufacturers, and not to discourage them with a prospect of losing what limited position they may have acquired with know-how and patent rights in a field just emerging from complete Government domination.

In short, the first effort, probably, should be to secure development of the more nearly conventional components through encouraging normal industrial initiative. Research and development on a basis of full support and free dissemination of information is preferable for the more basic types of developmental problems. Furthermore, such a schedule would be impractical if an attempt is made to handle all the details of planning, engineering, reactor development, and other matters with minimum (rather than adequate) assistance from this country.

4. The types of proven reactors contemplated in the agreement appear adequately desirable for export at this time. This should not preclude the possibility of accepting other types, if their development work is completed early enough.

5. A time schedule with a limiting date of 1963 is possible, though difficult. It would be next to impossible if the start is delayed for a year.

6. The cost estimate of $350 per kilowatt, exclusive of fuel, seems realistic for the types of plants contemplated for construction in Europe, assuming a differential of about 20 percent between costs in Europe and in this country, and omitting any possible effects of monetary inflation during the period. The figure is roughly consistent with estimates made in connection with the AIF growth survey, to which reference was made above.

7. See comments under 2 above.

8. There are doubtless many practical details pertinent to estimating reprocessing costs which are not set out in published data. The total body of available information, however, seems adequate for the needs of the Euratom program at this juncture. Additional information may be needed later when the character of the fuel is better known.

9. The proposed program would lend aid to the United States domestic power program by helping to increase the base load and experience of leading reactor designers, manufacturers and fuel processors. This should have a beneficial effect by providing added stability in the fuel development programs, which are so important to overall costs, and should in itself contribute to more rapid reduction in the costs pertinent to domestic nuclear plants. And if reactor equipment suppliers secure a proportion of this business it should similarly aid them.

The program will probably be viewed by United States manufacturers as a means for bolstering the present pace of nuclear business, and a means for undertaking joint ventures with European associates—and not as a means for establishing a good, long-range export business to Europe. Hence, the interest of United States manufacturers may depend to a large extent on their ability to work out partnership or joint venture arrangements with European associates.

With respect to the distribution of technical information, reference is made to comments under section 2 above concerning possible implications of the patent arrangements.

We appreciate the opportunity to be of any assistance in this matter, and trust these comments will be helpful to the committee in its deliberations.

Yours very truly,

FREDERICK H. WARREN.

EXCERPTS FROM A GROWTH SURVEY OF THE ATOMIC INDUSTRY, 1958–68, BY PICKARD-WARREN-LOWE ASSOCIATES, FEBRUARY 1958

"It appears highly important the joint collaboration of American experience with foreign industry be developed. This will be needed if there is to be achieved, as early as practicable, active development of nuclear power for use abroad, particularly in Europe.

"Such joint enterprise would benefit Europeans, even though they might eventually be able to produce reactor components more economically for themselves, because United States and United Kingdom experience can help bridge the time needed to acquire know-how and train specialized talent, and in addition, be of assistance in pointing out the most critical problem areas, thus minimizing the expensive trial and error period.

"Europeans would also benefit by not having to wait until capital could be provided and added industrial fabricating capacity built.

"The United States, in turn, would reap its own benefits from joint endeavor. Both the expanded market for nuclear know-how and production during the period preceding economic nuclear power in this country, and the opportunity to share in the lessons learned from operation of European units, would prove valuable indeed."

PRINCETON UNIVERSITY,
BOARD OF SCIENTIFIC AND ENGINEERING RESEARCH,
Princeton, N. J., July 14, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: This letter is in response to yours of June 28, asking for comments on the Euratom proposals of the AEC. From Mr. Ramey's telegram of July 3, I understand the deadline for such comments is deferred until July 15. Although I have reviewed the documents you sent me with some care, they are so involved and necessarily leave so many questions unanswered that my comments are more in the nature of doubts or questions than specific objections or suggestions.

For convenience I shall repeat the questions you list and give my comments in the form of answers to them:

1. Do you believe that the general approach and major provisions of the proposed arrangement are appropriate for our atomic power program abroad?

Answer. Yes, I think the general approach is good though perhaps somewhat more favorable to European power development than the present attitude toward such development in this country, specifically by guaranteeing the life of fuel elements.

2. Are the specific types of United States assistance provided for in the proposed arrangement desirable? If not, what other types of assistance would you suggest?

Answer. I have no suggestions for additional types of help.

3. Do the types of assistance provided for pose any serious problems, from a technical or industrial standpoint, with regard to the sale of United States reactors, components, and fuel elements abroad?

Answer. I am not sufficiently familiar with the sales problems of industry to comment.

4. Do you believe the types of reactors contemplated in the agreement are desirable for export abroad? Do you believe any other types should be included? If so, what are they?

Answer. The types of reactors contemplated are currently the only ones for which this country can guarantee performance. However, this situation may change in the next few years. The flexibility implied in the exchange of correspondence between Kohnstamm and Cooke is very important and should be emphasized.

5. What are your views as to the phasing or scheduling of the projects, particularly with regard to plans for selection of reactor types and the limiting date of 1963 for completion of construction?

Answer. The schedule seems somewhat optimistic, particularly in view of the rather cumbersome mechanism requiring technical approval by both Euratom and the United States Atomic Energy Commission. If in fact the program falls behind schedule, the possibility of other types of reactors mentioned in the answer to question 4 becomes even more important.

6. Do you consider the cost estimate of $350 per kilowatt (exclusive of fuel) to be realistic?

Answer. On the basis of general experience, this cost estimate seems minimal but I have no detailed knowledge on which to base a criticism.

7. Do you favor a system wherein the United States Government guarantees fuel-element performance and in effect underwrites the fuel costs in this program?

Answer. This provision is probably the most important in the whole document and appears to be essential to acceptance by Euratom. I have heard that some private companies are now willing to give similar guaranties of fuel-element performance. Perhaps incentives could be worked out to encourage such private guaranties with the United States Government in effect insuring them. The guaranties are not unreasonable technically, though experience with power reactors in this country is insufficient to insure such performance by fuel elements. On the whole, I would favor this provision (see answer to question 9).

8. Is the published information on AEC fuel-reprocessing costs adequate for normal business negotiations in connection with the Euratom program?

Answer. I do not know.

9. What are the implications of this program for our own domestic program? Are there adequate provisions for making available to American industry the technical information developed in the joint research and development effort?

Answer. I believe this whole proposal is justified for two reasons. First, that we are interested in developing the technology of nuclear power at minimum cost and therefore will support a program of building nuclear powerplants in high-cost areas—for example, Western Europe—if such construction will develop the technology. Second, but less important, because the program is generally consistent with our policy of strengthening the economy of Western Europe.

The implication of this program for our domestic program is that we shall get information from the construction and operation of big powerplants at less cost than by a comparable building program in this country.

Mere geographical separation will diminish the usefulness to United States industry of information developed in this program. Special efforts must be made to counteract this effect. In the research-and-development program this should not be difficult. Adequate exchange of operating and processing information will be more difficult to insure. Much will depend on what companies do the work, and on how the whole program is administered.

As you know, I have been interested for some years in the establishment of an appropriate program for the development of nuclear power in this country. The proposed Euratom program complements the program we have been discussing for this country. The emphasis of the Euratom program is the construction of large powerplants for immediate use, while the United States porgram puts

major emphasis on new types of reactors and on research and development aimed at eventual reduction of costs.

Hoping these comments may be of assistance to you.

Sincerely yours,

HENRY D. SMYTH, *Chairman.*

RAYTHEON MANUFACTURING CO.,
RESEARCH DIVISION,
Waltham, Mass., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: Your request for comments from industrial representatives on the proposed agreement between the United States and Euratom seems most appropriate and I am glad to respond within the limitations of my experience and knowledge. Because of these limitations my comments bear only on your questions 1, 4, and 9.

Your first question requires a definition of the objectives of our atomic-power program abroad. I believe it is recognized that reactors will probably not be sold extensively by the United States for profit abroad, but we can hope for strengthened political ties with those we help in solving their power problems. We can also expect to advance our own reactor technology by participating in foreign atomic-power programs.

Since Euratom's requirement for 1 million kilowatts is immediate, the only help we can offer to satisfy that requirement is the technology of the PWR and BWR. The proposed arrangement seems appropriate for that purpose.

However, many experts in the field of reactor design currently believe that water reactors offer very limited promise for ultimate economic power generation and they will eventually be outmoded by other more advanced types designed to operate at the higher temperature of a modern steam turbine. I would prefer to see an agreement with Euratom which recognizes that better types of reactors will be developed, possibly in time for their second lot. In order to emphasize this possibility and to give the program a forward look I would recommend that the joint research-and-development program be broadened to include studies of advanced concepts in addition to those for the improvement of reactors involved in the program.

Section 6, paragraph B, of the memorandum of understanding already provides informally that both parties carry on research and development at an unspecified level on advanced civilian reactor designs, the results of which will be fully and promptly exchanged. This seems to be a very good provision of the agreement. I doubt that the provision for a formal $50 million program on improvement of reactors involved in the program can be satisfactorily administered or that it carries much meaning. It is too difficult to define research and development in contrast to engineering and construction or to segregate its cost. I would prefer to see the former provision broadened to include all objectives with no formal reference to the level.

The proposed agreement with its emphasis on water reactors carries a risk that Euratom will become entrenched in an outmoded technology with the retardation of economic development of atomic power in Europe and the United States. If Russia should be ready with advanced types before we are we must face the possibility that our ties with Euratom would be weakened. We might guard against such an eventuality by recognizing in the present agreement the deficiencies of the water reactors and by giving emphasis to forward-looking research and development on the advanced designs of the future.

Very sincerely yours,

THOMAS H. JOHNSON, *Vice President.*

ROBERT LEBARON ASSOCIATES,
Washington, D. C., July 19, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
The Capitol, Washington, D. C.

DEAR MR. DURHAM: I wish to acknowledge your letter of June 30 and thank you for the opportunity to comment on the proposed agreement with Euratom which the Joint Committee on Atomic Energy will presently consider.

As you know, my interest in peacetime atomic energy lies mainly in its uses and applications.

I have devoted some effort to the general problem of building new industrial complexes in lesser developed countries where moderate-sized atomic reactors may have a small but vital role, but these reactor situations are so different from the considerations involved in the Euratom proposal, that I would prefer not to offer any partial or premature judgments.

With kind regards,

Sincerely,

ROBERT LEBARON.

THE RUST ENGINEERING CO.,
Pittsburgh, Pa., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy
Congress of the United States, Washington, D. C.

DEAR SIR: We appreciate the opportunity afforded by your letter of June 30 to comment on the material submitted in respect to the proposed Euratom agreement.

In order to give you a viewpoint and perspective from which to evaluate our comments, we feel we should briefly state our company's experience and background. We have been engaged in the field of general engineering and industrial construction for major industrial plants, typically steel mills, paper mills, manufacturing plants, industrial furnaces, and powerplants of the conventional types. While we have done engineering in the atomic industrial field, our activities in the atomic industry have been principally confined to construction of facilities for which basic engineering was done by others.

Our comments, numbered in like manner as the questions in your letter, are as follows:

1. It is our opinion that the approach and major provisions of this program are appropriate for our atomic-power program abroad. We believe a program on this order is a corollary to our foreign policy and that our policy would suffer and fall short of its objectives if we failed to follow through with such an essential measure. In addition to the benefits flowing from the strengthening and economic unification of Europe, our domestic program for industrial use of atomic energy will be benefited. We believe the proposed approach is well conceived and implemented.

2. So far as our knowledge of the background extends, it is our opinion that the specific types of assistance provided for in the proposed arrangement are desirable. The material enclosed with your letter indicates to us that the provisions have been worked out with thought and care; and it appears to us that, in any event, negotiations with the Euratom nations have progressed to a point that it would be harmful to the basic program to make changes at this time in the essence of the proposal.

3. Although companies engaged in the sale of reactors, components, and fuel elements would be better equipped than we to comment on this, we do believe that the types of assistance provided for do not pose any serious problems, from a technical or industrial standpoint, to sales abroad. We believe the program would indeed facilitate, rather than hinder, sales abroad.

4. We consider that our activities in this field have not been such as to qualify us to give the committee any comment that would be helpful on the question of the desirability of the types of reactors contemplated for export.

5. We believe the phasing or scheduling of the projects, and specifically the completion of the projects by the end of 1963, is realistic and attainable. This belief is buttressed by our experience in constructing projects of the magnitude of these. This is based on the assumption, however, that the projects will be built on designs already carried to a high degree of development and proof, which appears to be implicit in the program. The scheduled goals would require starts of construction after a minimal amount of time spent in the specific adaptation of basic designs already developed.

6. We have not sufficiently investigated the costs of constructing atomic powerplants to make any helpful comment on whether the estimate of $350 per kilowatt is realistic.

7. We do favor a system wherein the United States Government guarantees fuel element performance and, in effect, underwrites the fuel costs in this program. It appears to us that this is a crucial necessity of starting a program, and that it is appropriate for the United States to do so in the circumstances.

8. We have not sufficiently investigated the problem to make any comment on whether the published information on AEC fuel-reprocessing costs are adequate for normal business negotiations in connection with the Euratom program.

9. We believe that this program will greatly benefit and accelerate our own domestic program for peaceful uses of atomic energy. Considering that the need for atomic power is more pressing in Europe than it is in the United States, because of the scarcity of fossil fuels and the need for an independent source of supply, it seems likely that developments to make atomic power more nearly competitive in cost with conventional power might be attained more rapidly in Europe than in the United States. Such acceleration of development, as well as the assets and skills invested by the Euratom countries, would be directly beneficial to our domestic program. The proposed provisions for making the technical information developed in the joint research-and-development effort available to the United States appear to us to be adequate.

We hope these remarks will be of some help to the committee in evaluating the proposed program.

Very truly yours,

R. L. HESS, Jr., *Vice President.*

SARGENT & LUNDY,
Chicago, Ill., July 9, 1958.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SIR: In response to your letter of June 30, 1958, we are pleased to have the opportunity to express our views on the questions set out in this letter. In formulating our reply, it should be recognized that the views more nearly represent reactions rather than studied conclusions.

1. Do you believe that the general approach and major provisions of the proposed arrangement are appropriate for our atomic power program abroad?

Assuming it is desirable to sponsor and support such a program, the general approach appears satisfactory. Certain of the major provisions are covered by subsequent questions.

2. Are the specific types of United States assistance provided for in the proposed arrangement desirable? If not, what other types of assistance would you suggest?

It is not clear that United States private industries such as manufacturers, architect-engineering firms, and construction companies will have an opportunity to actively participate in the program. We believe such participation is important to insure success of the Euratom program and also important in furthering our domestic program.

3. Do the types of assistance provided for pose any serious problems, from a technical or industrial standpoint, with regard to the sale of United States reactors, components, and fuel elements abroad?

The guaranties, with respect to fabrication and fuel-cycle costs, will no doubt require similar conditions to be met in the sale of United States reactors at home and to the foreign trade.

4. Do you believe the types of reactors contemplated in the agreement are desirable for export abroad? Do you believe any other types should be included? If so, what are they?

We agree with the choice of water reactors. We believe that there is more known research and technology available in this country on the so-called water reactors than any other type. Under the proposed plan, they should be exploited to the greatest practical extent. In so doing, the concepts should be pointed toward higher steam temperatures and pressures together with nuclear superheat.

5. What are your views as to the phasing or scheduling of the projects, particularly with regard to plans for selection of reactor types and the limiting date of 1963 for completion of construction?

The schedule of having all commitments made prior to the end of 1959 and construction work completed by the end of 1963 seems to be a relatively tight schedule for a program consisting of some 6 full-scale reactors totaling approximately 1 million electrical kilowatts. This seems particularly true when it is recognized that a substantial amount of coordination will be

required between many different groups to engineer, construct, and place such a program in successful operation. We suggest that, rather than extend the date for the entire program, provision be made for review of each project with extension of an individual schedule being permissible where warranted.

6. Do you consider the cost estimate of $350 per kilowatt-hour (exclusive of fuel) to be realistic?

Offhand, the cost of $350 per kilowatt-hour (exclusive of fuel fabrication and fuel charges) appears to be on the low side. However, the Euratom group should be in the best position to judge this figure since certain equipment will be procured in their area and the construction will be carried on in their area.

7. Do you favor a system wherein the United States Government guarantees fuel-element performance and in effect underwrites the fuel costs in this program?

Considering the present development of the art in nuclear-power production, it is recognized why Euratom would desire such guaranties and because of the cooperative position of the United States Government in this undertaking, its desire to work out guaranties is understood. However, the guaranties as now provided could be a deterrent to any incentive toward efficient and economical operation of the completed plant. For example, a fuel element with a specified guaranteed performance in terms of megawatt-days per ton could fail to achieve the indicated performance due to misoperation of the plant such as letting the fuel elements overheat or cause damage in other ways which would shorten the fuel life. Certainly, there should be some incentive to promote efficient and economical operation of these completed plants. We would suggest consideration be given to an arrangement for fuel fabrication and performance whereby the fuel elements would be furnished at a guaranteed price, properly adjusted to reflect different types of fuel, different types of cladding, and cost changes due to development of the art and the fuel performance would be covered by having a supplier be responsible for the complete core and fuel assembly, under which conditions a demonstration fuel test could, in effect, be a performance guaranty. In the absence of defective fuel materials, workmanship, etc., the plant operator would then have the responsibility for achieving the agreed-upon fuel performance. With a conservative rating given to the fuel element, there should be an added incentive on the part of the operator to exceed the performance standard.

8. Is the published information on AEC fuel-reprocessing costs adequate for normal business negotiations in connection with the Euratom program?

We feel that the published information on AEC fuel reprocessing costs could form the basis for a normal business negotiation in connection with the Euratom program.

9. What are the implications of this program for our own domestic program? Are there adequate provisions for making available to American industry the technical information developed in the joint research and development effort?

The construction of a series of full-scale nuclear powerplants should bring forth helpful information for use in the development of our domestic program, particularly if private industry is permitted to participate actively in the several phases of the Euratom program.

We feel that one of the principal benefits to be gained by the United States participation and financial support of the Euratom program would be the resulting information to American industry on all phases of the program. While it is implied that such participation will be made possible and information will be made available, the provisions should be carefully worked out to insure the accomplishment of this end.

Yours very truly,

SARGENT & LUNDY,
By A. Kolflat.

(Copy of telegram)

SYLVANIA-CORNING NUCLEAR CORP.,
Bayside, N. Y., July 14, 1958.

Chairman CARL T. DURHAM,
Joint Committee on Atomic Energy,
Washington, D. C.:

Re your June 28 letter requesting comments on proposed Euratom agreement, feel United States negotiators have done outstanding job under circumstances. There are certain areas in proposed agreement that will need clarification and perhaps even further negotiation within existing proposed framework. Refer particularly to requirements for exchange of technical information, fuel-element guaranties, problems of third-party liability, and possibility of adding additional reactor types. However, firmly believe proposed agreement provided adequate framework within which these problems may be resolved through intelligent interpretation and administration by our own AEC and proposed Joint Commission. While proposed agreement will undoubtedly build up European nuclear industry, feel this is inevitable under any circumstance and in any event in interests of overall United States foreign policy. Present proposal probably represents only hope for orientation of European industry toward American-type reactors and fuels. Above all, feel proposed agreement is particularly significant to facing up to the problems of cost reduction in making nuclear power economically competitive. If tied in with and backed up by an integrated domestic program with reactor types left to private determination through competitive bidding, but with same primary objective of cost reduction aimed at competitive nuclear power, proposed agreement will indeed represent major step forward in development of our atomic power program both at home and abroad.

SYLVANIA-CORNING NUCLEAR CORP.,
LEE L. DAVENPORT, *President.*

UNITED ENGINEERS & CONSTRUCTORS INC.,
Philadelphia, Pa., July 8, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. CHAIRMAN: We acknowledge your letter of June 30 together with the substantiating data presenting the proposed agreement with Euratom.

Specifically replying to the nine items as requested in your letter, we believe that the answers to all items except No. 6 are in the affirmtive.

In regard to item 6 on cost estimates, it has been our experience that the costs have always been considerably greater, due ordinarily to the lack of detailed knowledge in scope of each project and the continuing cost increases. It would therefore be our suggestion that this consideration cost be more in the neighborhood of $500 per kilowatt, exclusive of fuel.

We heartily encourage the acceptance of the President's proposal.

Yours very truly,

A. G. MIDDLETON, *Vice President.*

VITRO CORPORATION OF AMERICA,
New York, N. Y., July 2, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. CONGRESSMAN: We have your letter dated June 28, together with supporting documents referring to the proposed agreement with Euratom for cooperation in nuclear power development under sections 123 and 124 of the Atomic Energy Act of 1954.

Since we are intimately concerned with the carrying out of such a program and already involved in certain phases of it, we will be most happy to respond to your request for our views on the specific questions outlined in your letter, together with any other general comments. We note that you require this

information no later than Wednesday, July 9, and we will endeavor to do the best we can in complying with your request within the time allotted.

Thank you, indeed, for offering us this opportunity.

Sincerely,

J. CARLTON WARD, JR., *President.*

VITRO INTERNATIONAL
DIVISION OF VITRO CORPORATION OF AMERICA,
New York, N. Y., July 31, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. CONGRESSMAN: We have previously received your letter of June 28 together with supporting documents with reference to the proposed agreement with Euratom and cooperation in nuclear power development and more recently, your invitation to present our views on these proposed agreements at the public hearings which your committee is holding in Washington.

We are unable to appear at this time but we are intimately concerned that the proposed program be carried out. Since we are already active in the nuclear power program in Europe, we take this opportunity to express our views on the proposed legislation.

After review of the material which your committee has made available and after the opportunity we have had to discuss this program with representatives of the Joint Atomic Energy Committee on July 8, 1958, we are of the opinion that the proposed agreements with Euratom are appropriate for the highly desirable objectives which they aim to achieve.

No undertaking as complex as the program which is proposed can be without problems. However, we see no problems of a magnitude so great that they would preclude the successful achievement of the objectives which are aimed to bring the benefits of the peaceful atom to the European community. Certainly, one technical problem will be that of determining the actual burnup experienced by individual fuel elements in connection with the guaranties available under the program. Also, because of the direct loan of funds by the Export-Import Bank to Euratom, there may arise problems over the ratio of moneys spent in the United States as against those expended in Europe. It would also seem that there may be some real cause for concern over the provisions which require that manufacturers make available design information in order to qualify under the program. We have been advised that the intention is that manufacturing know-how and technique would be protected, but certainly there is reason to expect that there may be confusion over the fact that the wording of the agreements require that designs, plans, and specifications be made available freely to Euratom.

Speaking more generally, it is probable that a period of concentration on one generic reactor concept such as envisioned in the United States-Euratom program will have the effect of encouraging and speeding the full development of alternative concepts on the purely domestic scene. This encouragement of advanced concepts at home while proving and improving fuel cycle costs for the water type reactors abroad appears to be an admirable compromise which recognizes the different time schedules and different power generating costs which characterize the European problem as opposed to the United States requirements.

The specific types of assistance which the United States-Euratom program proposes are those which we feel are necessary to achieve the stated goals and feel that the guaranties for fuel cycle costs are a desirable feature which recognizes the competitive realities which we must face in the European markets.

As for the types of reactors contemplated in the agreement, it is obvious that there are included the concepts which are of immediate interest today among United States users. However, we wonder if there should not be included the organic moderated and cooled reactor concept which we feel has many similarities to the water reactor approach and which concept could be included in the program with little, if any, dilution of the objectives of the program.

We feel that there are many aspects of this program which remain to be settled but that in general the benefits which will accrue to the United States Government and to its industry in furthering the peaceful uses of atomic energy to our friends and allies overseas clearly justify prompt approval of this agree-

ment with Euratom. We therefore, urge that your committee recommend approval of the enabling legislation so that this agreement with Euratom may be approved at this session of Congress and that the program to implement the objectives of this program can proceed promptly.

Very truly yours,

NORMAN A. SPECTOR.

1029 CONNECTICUT AVENUE NW.,
Washington, D. C., July 18, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
The Capitol, Washington, D. C.

DEAR MR. DURHAM: This is in response to your letter of June 28 requesting my comments on the proposed agreement with Euratom for nuclear power development.

As the committee knows, I have long supported the view that the most effective way to develop nuclear power is to construct and operate plants. Agreement on a program as envisaged by the proposed United States-Euratom arrangement should provide a valuable opportunity. I will not attempt to judge the merits of the proposed approach, selected from the several possible approaches providing for international cooperation. This question is one of national policy on which I do not feel qualified to comment. I am confident that it will be given careful consideration by the committee.

With regard to the general provisions of the proposed agreement and related documents, I have the following comments. I believe it would be desirable to delete the use of the phrase "proven types" as a criterion for the selection of reactor projects for the joint program. Although such a criterion considered alone is difficult to define, it appears to be implicit in the proposed agreement, together with the memorandum of understanding and attachments thereto, that "proven types" refers only to "light water cooled and moderated" reactor systems. This preferred treatment will handicap other reactor systems, such as those using heavy water, liquid metal, graphite, organics, and gases, which may conceivably be better proven than some light water concepts; for example, one utilizing nuclear superheat. In my opinion, the basic agreement and related papers should neither explicitly nor implicitly discriminate against reactor systems which may be proposed with manufacturer's guaranties comparable to those available for light water reactors. I believe that each proposed project should be considered on its own merits.

With regard to fuel element guaranties, it is my impression that the proposed arrangement is unnecessarily complicated, would be difficult to administer, and would tend to reduce, if not eliminate, the normal competitive incentives for the development of low-cost, long-life fuel elements. Its inconsistency with current AEC practice in relation to the power demonstration reactor program raises the question why such guaranties should not also be applicable to United States projects. However, if such guaranties are to be included in the arrangement, it seems to me that they should be defined in terms to include design operating conditions as well as in terms of selected combinations of reactor materials.

Although admittedly I am not familiar with the many intricacies of the problem of arriving at a suitable agreement with Euratom, I would like to suggest, as a basis for an arrangement, a provision whereby the United States would contribute a fixed dollar amount over the proposed 10-year period, which fund could be allocated either against research and development costs or against excess fuel costs. Such an arrangement would be consistent with the proposed fixed contribution to the joint research and development program. It would allow for differentials in conventional fuel costs at different sites and would provide a more flexible use of funds in the overall program. It would also relieve the United States Atomic Energy Commission of the necessity of entering as a third party into open-end contractual arrangements. The Commission would still supply, under contract at stated price schedules, materials and services which it can render and which are not available from industry.

In view of the amount of material and the complicated, detailed arrangements of the proposed agreement, I do not feel that in the limited time at my disposal my review warrants more than the above general remarks. I wish, however, to thank the committee for allowing me this opportunity to present my comments.

Very truly yours,

GEORGE L. WEIL.

COMMENTS ON EURATOM AGREEMENT

Alvin M. Weinberg

1. It is my belief that the general approach and major provisions of the arrangement are appropriate when considered from the viewpoint of using nuclear reactors as instruments of policy. Although the fuel cycle subsidy provisions make me a little uneasy, I am reassured by the provision that the total commitment of the United States for fuel cycle subsidy is $90 million.

There is a good chance of achieving the proposed fuel cycle costs without the subsidy; however, I don't think anyone can say this with complete assurance. Moreover, even if the 10,000 mwd/t is achieved, is it clear that the 4 percent inventory charge will be maintained after the expiration of the agreement? If it is not maintained, the fuel cycle costs may rise significantly after the expiration of the agreement. I mention this only to stress what I am sure the framers of the proposal know: That there is some gamble in entering into an arrangement with such subsidy provisions and there is a finite, though I would judge small, chance that the gamble will not pay off.

2. The types of assistance seem to be adequate.

3. If I interpret the question to mean that the proposed assistance arrangement may make it more difficult to sell reactors of similar types to countries which do not have the fuel cycle subsidy, the answer is "Yes," it will make it more difficult. Countries will choose reactor types with as low cost as possible, and I suspect countries will always choose types which can achieve low cost without subsidy rather than with subsidy. In this connection I point out that fuel cycle costs in gas-cooled reactors are somewhat lower than in water-cooled reactors; it is quite possible that countries will tend to choose gas-cooled reactors in spite of their higher capital costs simply to avoid dependence on a somewhat uncertain fuel cycle subsidy.

4. If the implication is that the proposal be limited to pressurized water reactors, this would be a mistake since it is not certain that the goal of 4.2 mills per kilowatt-hour fuel cost without subsidy can be reached with pressurized water reactors.

5. I have no strong views on this.

6. Yes.

7. This, it seems to me, is the essential point in the whole agreement. As I have said, I believe the 4.2 mills per kilowatt-hour fuel cycle cost probably can be achieved without subsidy; however, this is not a certainty. I would therefore hope that in the hearings before the committee the question of the likelihood of achieving the 4.2 mills per kilowatt-hour be pursued in some detail.

8. Yes.

9. (*a*) I think that the Euratom arrangement will tend further to channelize the American effort toward pressurized water reactors, since it is most likely that these will be constructed for Euratom. This may mean that less effort will go into other reactor types which should be supported—in particular, that less effort might be available for the power breeder program. If the Euratom program in fact drew support away from the power breeding program, I would consider it not well advised from the point of view of advancing technology in the United States. My own feeling is that as far as advancing technology along lines which are already well estbalished is concerned—particularly along the pressurized waterline—the Euratom reactors will not contribute as much as would a program directed specifically toward fuel development. On the other hand, I think the Euratom agreement can find very substantial justification from considerations of foreign policy and is therefore worth supporting.

9. (*b*) Yes.

WESTINGHOUSE ELECTRIC CORP.,
Pittsburgh, Pa., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. DURHAM: We are pleased to reply to your letter of June 28, 1958, which requested comments on the proposed agreement with Euratom. Based on our many discussions with electric-utility companies in the Euratom community, we are satisfied that the proposed agreement will facilitate the application of United States reactors in Europe.

The following are our comments on the specific quesions rased in your letter:

1. In general, we believe that the approach and major provisions of the proposed agreement are appropriate for our atomic-power program in Europe. Problems of interpretation will naturally be encountered. However, adequate and fair interpretations would appear to be possible within the framework of the agreement as written.

2. Highly desirable features of the agreement are the research and development assistance, the loan of capital funds at reasonable interest rates, and the availability of uranium at a cost comparable to that charged in the United States. Support of the complete fuel cycle as proposed, assures the utility of a ceiling fuel cost but, at the same time, encourages development work to further improve the fuel cycle. This assurance without loss of initiative is highly desirable.

3. The types of assistance provided for do pose some significant administrative problems. These come about primarily because of the number of parties involved in the contractual arrangements for a specific plant. It would appear that the agreement, however, can be made workable if simplified administrative procedures are stressed in making interpretations of the agreement.

4. We are convinced that only light-water reactors can be included in the initial program. The end date of 1963 precludes consideration of other types since large plant operating experience will not have been accumulated in time.

Westinghouse has been providing equipment for the foreign market for over 50 years and experience has taught us to supply only equipment on which we have had prior experience in the United States.

5. It is our opinion that the United States manufacturers can supply the 1 million kilowatts of generating capacity by December 31, 1963, providing that Congress passes the necessary legislation during the current session, and initial contracts are finalized by the end of the year. Obviously research and development work to improve the fuel cycle should commence just as soon as possible.

6. We believe that $350 per electric kilowatt is a reasonable figure for the purposes intended in the agreement. This figure could, however, be exceeded in specific cases if site conditions, import duties, taxes, plant size. and other economic factors are unfavorable.

7. The agreement proposes a reasonable method of assistance in view of the objective of accelerating the development of atomic power and the construction of nuclear plants in Europe. We believe, however, that in administering the program, the research and development should be tied in with the fuel cycle in order to assure lower eventual fuel costs to the utility and a diminishing United States support of the fuel cycle.

8. In our opinion, the published information on AEC fuel-reprocessing costs is adequate for negotiations with the Euratom Community. The Euratom program will decrease the time to economic power in the United States, particularly if the associated research and development program is adequately coordinated. The objective of the Euratom research and development effort should be lower power costs for the specific nuclear plants included in the program. Dilution of this objective by trying to cover too broad a research and development effort would be a mistake.

9. We believe that the agreement contains adequate provisions for making available to industry the information developed under the joint research and development effort.

The agreement does not offer any solution to the third party liability problem. The necessity of resolving this problem as recognized by the memorandum of understanding is of prime importance.

Based on discussions with AEC personnel, it is our understanding that section 8A of the memorandum of understanding does not compel United States industries to divulge their privately owned technical know-how to foreign manufacturers. We understand that one of the purposes of this section is to encourage the continuance of existing technical assistance agreements and foster additional agreements between American and foreign manufacturers.

It is our recommendation that the agreement be approved during this session of Congress in order to give momentum to the United States reactor program

in Europe. The United States manufacturers' negotiations are in such a stage that a great deal of ground will be lost if the legislation is not passed this summer.

Sincerely,

CHARLES H. WEAVER,
Vice President.

WESTINGHOUSE ELECTRIC CORP.,
BETTIS ATOMIC POWER DIVISION,
Pittsburgh, Pa., July 11, 1958.

Hon. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington, D. C.

DEAR MR. DURHAM: Your letter of June 28 raised certain questions on the proposed agreement with Euratom for cooperation in nuclear development. I am writing to forward my comments.

My answers to your questions are these:

Question 1. Do you believe that the general approach and major provisions of the proposed arrangement are appropriate for our atomic power program abroad?

Answer 1. I would expect that in the years ahead our atomic-power program abroad would be made up of several programs of which Euratom would be a major part. The general approach and the provisions of the Euratom agreement are appropriate for what we are trying to do now. Other programs and future industry-to-industry sales abroad could possibly call for different approaches.

Question 2. Are the specific types of United States assistance provided for in the proposed arrangement desirable? If not, what other types of assistance would you suggest?

Answer 2. Major assistance is needed if the Euratom objectives are to be met. All of the major areas in which assistance is needed are covered by the proposal. This assistance is desirable.

Question 3. Do the types of assistance provided for pose any serious problem, from a technical or industrial standpoint, with regard to the sale of United States reactors, components, and fuel elements abroad?

Answer 3. I think the scope of the proposed agreement is sufficiently broad that contracts arising under it could probably be executed without serious difficulty from either the technical or industrial standpoint. Of course, the agreement leaves unanswered such questions as indemnity from third-party liability, but the agreement expresses the hope that these can be resolved. For one, I think they will be.

Question 4. Do you believe the types of reactors contemplated in the agreement are desirable for export abroad? Do you believe any other types should be included? If so, what are they?

Answer 4. At least during the first 5-year period only reactors of proven design, such as light-water types, should be provided for under the agreement. In the years ahead nuclear power and Euratom means too much to Europe to risk having any controversy over hazards in the very first venture. Should we take a different course, much of the good will of our program could be clouded by propaganda accusations that we are using Europe as a test station for highly experimental reactors. Prudence seems to dictate that our safeguards standards be high.

Question 5. What are your views as to the phasing or scheduling of the projects, particularly with regard to plans for selection of reactor types and the limiting date of 1963 for completion of construction?

Answer 5. We have adequate industrial capacity in the United States to supply most components for the 1963 schedule. There are some long lead-time items and large size components which could cause delay. During the 1960–63 period, demand will be high on these items but the industries involved would probably arrange to meet the demand. I am in no position to comment on the capacity of the European groups who might be engaged in construction and structural work.

Question 6. Do you consider the cost estimate of $350 per kilowatt (exclusive of fuel) to be realistic?

Answer 6. The cost estimate of $350 per kilowatt (exclusive of fuel) is a target which could be realized if we were to build plants on which we have prototype experience.

Question 7. Do you favor a system wherein the United States Government guarantees fuel-element performance and in effect underwrites the fuel costs in this program?

Answer 7. There are enough unknowns in fuel performance and costs to make conventional-type financing difficult and the reasons for the proposed guaranties are most understandable. I favor them. I would caution, however, that manufacturing standards, specifications, and quality control should be carefully detailed by the United States Government. Reliable and proven producers could be placed in a competitive disadvantage were anyone to cut costs by sacrificing quality, knowing that the Government was guarantor.

Question 8. Is the published information on AEC fuel-reprocessing costs adequate for normal business negotiations in connection with the Euratom program?

Answer 8. The AEC has published figures on these costs and the information is adequate for business negotiations.

Question 9. What are the implications of this program for our own domestic program? Are there adequate provisions for making available to American industry the technical information developed in the joint research and development effort?

Answer 9. This program would have a stimulating effect upon our domestic industry. In terms of the information which will be developed under the program, there are adequate provisions for making this information available to American industry.

The Euratom agreement is an imaginative foreign policy innovation. It would be difficult, indeed, for us to expect perfection from its every clause and provision. Taken as a whole, it is a good plan and if there is good will on the part of every participant, it should succeed.

Very truly yours,

J. W. SIMPSON,
Vice President and General Manager.

WESTINGHOUSE ELECTRIC INTERNATIONAL CO.,
New York, July 15, 1958.

Hon. CARL T. DURHAM,
House of Representatives, Washington, D. C.

MY DEAR MR. DURHAM: On June 28, 1958, you wrote to Mr. G. H. Weaver, vice president, atomic power, Westinghouse Electric Corp., requesting him to comment upon different facets of the proposed legislation to implement the agreement of understanding between the United States Government and Euratom. For your convenience, a copy of Mr. Weaver's reply is attached.

I believe that the members of the United States mission who negotiated the agreement of understanding are to be congratulated on having developed a concrete modus operandi with Euratom and on having established "ground rules" which, in my opinion, will be of valuable assistance to the development of atomic power in Europe and to the healthy growth of the atomic industry in the free world. This achievement is particularly significant in view of the numerous and complicated problems which had to be examined and the fact that the mission was dealing with representatives of sovereign countries.

I would like to stress in this letter the problem of "timing." In my opinion, for an understanding with Euratom to be effective, it should be implemented immediately. Nearly 3 years ago, at the first International Conference on the Peaceful Uses of Atomic Energy at Geneva, great hopes were aroused throughout the world that the United States atoms-for-peace program would have a concrete meaning, in the near future, for the well-being of the men and women of Europe and for the economics of their countries.

The second International Conference on Atomic Power will take place in Geneva beginning September 1, 1958, and unless some definite and large-scale program has been approved by our Congress before that date, we will face the danger of being accused of procastinating and "not meaning what we say."

Moreover, in such an event, it is to be expected that the delegation from the U. S. S. R. will move into this vacuum and announce ambitious programs for the future, detailing what has been accomplished with respect to atomic power during the last 3 years behind the Iron Curtain, and what assistance the U. S. S. R. has given, and will give, to its satellites and the uncommitted coun-

tries. In addition, as you know, British manufacturers and UKAEA are exerting every effort to establish themselves as the leading suppliers of large atomic powerplants throughout the world.

Some tangible action by the United States is needed, and needed now. I therefore believe that it is of vital importance to the welfare and prestige of our country that these bills, under consideration by the Joint Committee on Atomic Energy, be submitted to Congress and passed during this session.

Sincerely,

W. E. KNOX, *President.*

APPENDIX 3

SUMMARY OF COMMENTS RECEIVED FROM REACTOR EXPERTS AND INDUSTRIAL REPRESENTATIVES IN ANSWER TO JCAE LETTER OF JUNE 28 AND 30, 1958, ON EURATOM PROPOSALS

On June 28 and 30, 1958, the Joint Committee on Atomic Energy sent a letter (appendix 1) to 63 reactor experts and industrial representatives requesting comments on 9 specific questions relative to the proposed Euratom agreements. Forty-five replies were received. (The replies are printed in appendix 2). Following is a brief summary of the replies:

1. Question. Do you believe that the general approach and major provisions of the proposed arrangement are appropriate for our atomic power program abroad?

Answer. Unanimous "yes."

2. Question. Are the specific types of United States assistance provided for in the proposed arrangement desirable? If not, what other types of assistance would you suggest?

Answer. All but five of those who responded to this question indicated that the assistance proposed was desirable. One of the five thought more research and development assistance should be provided. One stated that the guaranty of fuel element fabrication cost and life would not be useful since it might remove cost reduction incentives. Two indicated that it was not clear that the proposed agreements provided sufficient opportunity for the active participation of United States private industries such as manufacturers, architect-engineers, and constructors. One questioned the need for $50 million for research and development on reactors which were already highly developed.

3. Question. Do the types of assistance provided for pose any serious problems, from a technical or industrial standpoint, with regard to the sale of United States reactors, components and fuel elements abroad?

Answer. All but seven indicated that they saw no serious problems. Four thought provisions for the protection of proprietary information should be added and made clearer. One thought the forms of assistance may favor purchase of components from European sources. One indicated that fuel guaranties would decrease incentive for cost reduction. Three thought the program would be difficult to administer due to the number of parties involved.

4. Question. Do you believe the types of reactors contemplated in the agreement are desirable for export abroad? Do you believe any other types should be included? If so, what are they?

Answer. All but seven indicated that they thought the reactors contemplated were satisfactory for this program. The remaining seven indicated more reactor types should be considered.

5. Question. What are your views as to the phasing or scheduling of the projects, particularly with regard to plans for selection of reactor types and the limiting date of 1963 for completion of construction?

Answer. All but nine thought the schedule was reasonable. The remaining nine all thought the schedule was too tight and recommended extensions from 1 to 2 years.

6. Questions. Do you consider the cost estimate of $350 per kilowatt (exclusive of fuel) to be realistic?

Answer. All but three thought the cost estimate was reasonable. Two thought it was too low and one thought it was too high.

7. Question. Do you favor a system wherein the United States Government guarantees fuel element performance and in effect underwrites the fuel costs in this program?

Answer. All but three replies favored the system of fuel gnaranties. Two thought the system proposed was too complicated. One though Euratom countries should pay rental on the fuel elements.

8. Question. Is the published information on AEC fuel reprocessing costs adequate for normal business negotiations in connection with the Euratom program?

Answer. All but four thought that the fuel reprocessing cost information was adequate. A few felt that costs also should be specified for startup, shutdown, and cleanup.

9. Question. What are the implications of this program for our own domestic program? Are there adequate provisions for making available to American industry the technical information developed in the joint research and development effort?

Answer. All thought that the proposed Euratom program would be of some benefit to the domestic reactor programs. One indicated that the Euratom program would be ill-advised if it resulted in a cutback in effort on other reactor types in the domestic program. All but four though the provisions for distribution of research and development program information were adequate. The four questioned the adequacy or stated additional details are required before specific comments can be made.

10. Additional comments received:

(*a*) Consider similar fuel-cycle guaranties in the domestic program.

(*b*) Encourage European chemical reprocessing of fuel elements.

(*c*) Should not require disclosure of manufacturers' background information.

(*d*) Consider feasibility of manufacturing those fuel elements to be guaranteed by the AEC in AEC plants.

(*e*) Implement program immediately.

(*f*) Make certain fuel element guaranties are specified in thermal megawatt days per metric ton.

(*g*) Strive for early settlement of third party liability problems.

(*h*) Provide incentives for utilities to better operating performance of fuel elements.

(*i*) Provide for participation by fuel manufacturer in decisions regarding replacement of guaranteed fuel elements.

APPENDIX 4

SUMMARY OF REACTOR PROJECTS WITHIN THE EURATOM COUNTRIES

(Submitted by the Atomic Energy Commission as Attachment B to letter of July 29, 1958)

Twenty-five research reactors are in operation or being built within the Euratom countries: 9 in France, 7 in West Germany, 4 in Italy, 3 in the Netherlands, and 2 in Belgium. Of these, 6 have been in operation in France, 2 in Germany, 1 in the Netherlands, and 1 in Belgium.

Eight power reactors are in operation or being built, with France having the most extensive power program at this time. In 1956, the French G–1 reactor at Marcoule produced the first electricity from nuclear power on the European continent (although less than station load, so there was no net electricity produced). The G–2 and G–3 reactors at Marcoule are expected to be started up in 1958, and will produce 20 to 30 electrical megawatts each. Two more power reactors are under construction in France, with completion schedule in 1960. Westinghouse International is building a 11.5 electrical megawatt experimental power reactor at Mol, Belgium, with completion scheduled for 1959. Construction of two 15 electrical megawatt power reactors is about to begin in West Germany.

BELGIUM

A. RAW MATERIALS

1. Uranium and thorium: The Belgian Congo provides adequate sources of uranium (but no thorium). Although the rich pitchblende deposits of the Haut Katanga mines appear to be largely depleted, there are still extensive deposits of uranium ore of satisfactory grade.

Mining is almost wholly carried out by the Union Minière du Haut Katanga, which operates a concentration plant of 300,000 tons per year capacity.

Refining is done by the Société Générale Metallurgique de Hoboken (a subsidiary of Union Minière), which operates a refining plant with a yearly capacity of 450 tons of UO_2. A metal pilot plant of 150 tons per year capacity is to be in operation by early 1958.

2. Oil and coal: Present coal production is 30 million metric tons per year, expected to reach a maximum of 35 million tons by 1980. Present Belgian consumption is 28 million tons.

3. Hydropower: Practically none.

4. Heavy water: No facilities for D_2O production, and none presently contemplated.

5. Graphite: None.

B. PRINCIPAL ORGANIZATIONS AND LABORATORIES

1. Name: CEN (Centre d'Etude de l'Energie Nucléaire).

Location: Brussels.

Type: A quasi-official Atomic Energy Commission sponsored jointly by the Government, industry, and the universities. Recently reorganized to permit the receipt of financial assistance from both the state and private sources.

Principal officers: President, Pierre Ryckmans; vice president, H. Robiliart; managing director, Louis De Heem.

Interests and activities: Established to undertake research in and encourage the scientific and technical study of the applications of nuclear energy. Responsible for the development and operation of the Mol Laboratory.

2. Name: Mol Laboratory.

Location: Mol, 50 miles northeast of Brussels.

Type: Largest nuclear research laboratory in Belgium. Built and operated by CEN.

Principal officers: Technical manager, Dr. Julian Goens; program manager, Emile Hubert.

Principal facilities: 4-megawatt research reactor. A series of laboratories devoted to physics, metallurgy, electronics, engineering, etc.

3. Name: SEEN (Syndicat d'Etude de l'Energie Nucléaire).

Location: Brussels.

Type: Syndicate of some 20 large private industrial firms.

Principal officers: President, Herman Robiliart; managing director, Jean Van der Spek.

Interests and activities: Initially formed for purpose of producing materials required in the nuclear-energy field. In close cooperation with APDA, is working on the study and design of a fast breeder reactor. Will be dissolved in 1960 and will be completely replaced by Belgonucléaire.

4. Name: Belgonucléaire (Société Belge pour L'Industrie Nucléaire.

Location: Brussels.

Type: Company composed of about 30 industrial firms in Belgium, including Union Minière du Haut-Katanga, Société Générale Metallurgique de Hoboken, Cockerill-Ougrée, ACEC.

Principal officers: Chairman, H. Robiliart; executive director, M. de Merre; managing director, Jean Van der Spek.

Interests and activities: The survey, design, manufacture, sale, and operation of nuclear reactors and their component parts. Fuel element fabrication, chemical reprocessing, radioisotope development, etc. Is also a participant in NDA–Europe.

5. Name: BEN (Bureau d'Etudes Nucléaires, S. A.).

Location: Brussels.

Type: Architect-engineering firm, formed under joint sponsorship of Electrorail, Electrobel, Sofina, and Traction et Electricité.

Principal officers: President, Albert Thys; manager, F. Louis; managing director, Marcel DuBois.

Interests and activities: Design, engineering, and evaluation of nuclear powerplants.

C. REACTORS

1. Name: BR–1.

Location: Mol Laboratory.

Type: Natural uranium, graphite, air cooled.

Power: 3 to 6 megawatts (heat).

Built by laboratory staff.

Status: First startup in May 1956.

2. Name: BR–2.

Location: Mol Laboratory.

Type: Tank-type testing reactor.

Power: 15 to 50 megawatts (heat).

Built by Nuclear Development Cooperation of America and Belgian industry.

Fuel: 4 kilograms of highly enriched uranium.

Status: Scheduled for startup in 1959.

3. Name: Belgian thermal reactor.

Location: Mol Laboratory.

Type: Pressurized-water experimental power reactor.

Power: 11.5 megawatts (electric).

Built by Westinghouse International for SEEN.

Status: Was to have been operated at 1958 World's Fair in Belgium, but difficulties in getting Belgian Government to agree to proposed site as well as problems associated with third-party liability prompted relocation for Mol. Completion of the reactor is scheduled for 1959.

4. Name: Belgian medical reactor.

Location: Mol Laboratory.

Power: 1 megawatt (heat).

Status: In planning stage.

D. FUTURE PLANS; GENERAL COMMENTS

1. Systematic study of United States and United Kingdom experimental or industrial power reactors.

2. Selection of 1 type by the end of 1958, to be followed by construction of 3 successive full-scale powerplants of about 100-electrical-megawatt capacity over an 8-year period. Each reactor would be a "converter," i. e. produce plutonium as a byproduct.

3. Possible acquisition of several small nuclear-power stations (10 to 15 electrical megawatt) for use in the Belgian Congo and Ruanda-Urundi.

FRANCE

A. RAW MATERIALS

1. Uranium and thorium: Essentially all uranium ore for the French program comes from metropolitan France, the mines of major importance being at Margnac (Hte, Vienne), at the Bois-Noirs (Loire) and l'Ecapriere (Loire Atlan.). Deposits are estimated at between 50,000 to 100,000 tons of uranium content. Ores of less than 2 percent uranium are concentrated in the region where it was mined. These concentrates, as well as richer ores, are treated at the plant at Le Bouchet. Present production of uranium metal is 300 tons per year. With improvements at Le Bouchet and the construction of a new plant at Narbonne (southern France), production is expected to rise to 1,000 tons per year by 1961.

Very rich but limited deposits of uranothorianite (containing 60–70 percent thorium oxide and 10–20 percent uranium oxide) have been found in Madagascar. The ore is being processed at Le Bouchet to yield thorium nitrate.

Recent discoveries in Gabon (French Equatorial Africa) are being explored and may bring a new supply in a few years.

2. Oil and coal:

3. Hydro power:

4. Heavy water: Up to the present time, France does not produce heavy water on an industrial scale.

Plans are, however, underway for the development of larger scale sources of D_2O:

(*a*) Cie. Française de l'Eau Lourde, a subsidiary of Air Liquide and the Office Industriel de l'Azote, has been developing facilities in Toulouse for D_2O production, using the process of distillation at liquid hydrogen temperatures.

(*b*) A new company (SOD) is being formed by the French AEC, the Société des Pétroles d'Aquitaine, and Air Liquide, which plans to build a plant in southwestern France (near the natural-gas deposits at Lacq), for the production of heavy water by a chemical exchange process.

5. Graphite: The production of nuclear-pure graphite is performed at Pechiney, using a French process described at Geneva. Capacity of the Pechiney plant is about 2,000 tons of graphite per year. The fabrication of the graphite blocks for the large plutonium reactors (G–1, G–2, and G–3) and for EDF–1 was done at a specially built facility at Marcoule.

6. Beryilium: Beryl is available in rather substantial quantities from Madagascar.

B. PRINCIPAL ORGANIZATIONS AND LABORATORIES

1. Name: CEA (Commissariat a l'Energie Atomique).

Location: Paris.

Type: The French Atomic Energy Commission, a public agency with appreciable administrative and financial autonomy.

Principal officers: Administrator general, Pierre Couture; high commissioner, Francis Perrin; director for foreign relations, Bertrand Goldschmidt; director of programs (vacant); director of industrial development, Pierre Taranger; director for relations with national education, Jean Debiesse.

Interests and activities: The direction and implementation of the French atomic energy program.

2. Name: CENS (Centre d'Etudes Nucleaires de Saclay).

Location: Saclay, about 20 miles southwest of Paris.

Type: Largest nuclear research laboratory of the Commissariat. Staff of about 3,000 persons.

Principal officers: Director, Jean Debiesse; chief, pile studies, Jacques Yvon.

Principal facilities: Heavy-water research reactor (EL–2); heavy water test reactor (EL–3); reactor for lattice studies (Aquilon); homogeneous plutonium reactor (Proserpine); 2 Bev proton synchrotron (Saturn); 25 Mev cyclotron; 5 Mev Van de Graaff; physics, chemistry, metallurgy, and biology laboratories.

3. Name: Fontenay-aux-Roses (previously called Chatillon).

Location: Southern outskirts of Paris.

Type: Nuclear research center of the Commissariat.

Principal officer: Director, M. Baissas.

Principal facilities: Zoe research reactor, swimming-pool reactor, pilot plant for chemical reprocessing (to be dismantled), radioisotope preparation.

4. Name: CENG (Centre d'Etudes Nucléaires a Grenoble).

Location: Grenoble.

Type: Research center of the Commissariat in conjunction with the University of Grenoble.

Principal officer: Director, M. Neal.

Principal facilities: Swimming-pool reactor.

5. Name: Marcoule.

Location: 25 miles northwest of Avignon, in sourthern France.

Type: Largest industrial center of the Commissariat.

Principal officer: Manager, Maurice de Rouville.

Principal facilities: Plutonium-producing reactors G–1, G–2, and G–3; chemical processing plant; graphite machining plant.

6. Name: Le Bouchet.

Location: About 30 miles south of Paris.

Type: The uranium- and thorium-processing plant of the Commissariat.

Principal officer: Manager, P. Vertes.

Principal facilities: Uranium-processing plant (500 tons uranium per year capacity); thorium-processing plant approximately 300 tons thorium oxide per year).

7. Name: Electricité de France.

Location: Paris.

Type: French state electricity organization.

Principal officer: Director of research, Pierre Ailleret.

Interests and activities: The design, construction, and operation of the EDF nuclear reactors at Chinon.

8. Name: ATEN (Association Téchnique pour la Production et l'Utilization de l'Energie Nucléaire).

Location: Paris.

Type: Organization of industrial groups in France interested in the nuclear-energy field.

Principal officers: President, Robert Gibrat; first vice president, R. Baumgartner; secretary general, A. Mouterat.

Interests and activities: Serves the same role in France as the Atomic Industrial Forum in the United States.

9. Indatom (groupement pour l'Industrie Atomique).

Location: Paris.

Type: A group of some 10 important firms, each of which is specialized in a different field of importance in the development of nuclear energy.

Principal officers: Chairman, H. Malcor; director general, Robert Gibrat.

Interests and activities: Has established its own engineering and research team and uses the laboratories of its members. Is designing thorium U–233 chemical-separation pilot plant; 1-megawatt swimming pool reactor for Grenoble; nuclear-powered tanker ship (gas-cooled reactor).

10. Name: France-Atome.

Location: Paris.

Type: A group of some 20 industrial firms (an extension of those which worked on the G–1 reactor).

Principal officer: President, R. Baumgartner.

Interests and activities: Design and construction of the G–2 and G–3 reactors. Design study of a nuclear-powered tanker ship.

11. Name: Auxi-Atome.

Location: Paris.

Type: Group of smaller companies interested in the atomic energy field but which are not members of Indatom or France-Atome.

Principal officers: President, Gabriel Dessus; manager, J. Pellion.

Interests and activities: Design and construction of auxiliary nuclear equipment.

12. Name: Propatome.

Location: Paris.

Type: Firm formed by the three largest shipyards in France and the huge Schneider-Creusot heavy-machinery company.

Principal officers:

Interests and activities: To coordinate efforts in the field of nuclear propulsion. Plans to work closely with France-Atome.

13. Name: CARA (Compagnie d'Applications et de Recherches Atomiques).

Location: Paris.

Type: Company formed by a number of French firms, including Société Air Equipement, Société Continentale et Maritime des Pétroles, Compagnie Française des Minerais d'Uranium, and others.

Principal officers: President, Henry Ziegler; general director, Boisot.

Interests and activities: The industrial exploitation of nuclear energy.

14. Name: Satnuc (Société pour les Applications Techniques dans le Domaine de l'Energie Nucléaire).

Location: Paris.

Type: Company formed by a group of French chemical firms.

Principal officers: Chairman, J. Stoclet; director, T. Reis.

Interests and activities: To develop the applications of atomic energy principally in the chemical industry.

15. Name: SICN (La Société Industrielle des Combustibles Nucléaires).

Location: Annecy.

Type: Group of four companies and the CEA.

Principal officer: President, M. Bouly.

Interests and activities: Metallurgical problems which arise in the nuclear energy field; particularly fuel element fabrication.

16. Name: SODERN (Société Anonyme d'Etudes et Réalisations Nucléaires).
Location:
Type: Company.
Principal officer: Chairman and managing director, Louis Chove.
Interests and activities: To develop, manufacture, and sell apparatus and equipment used in atomic-power production. Will specialize in electronic equipment.

17. Name: SOD (Société d'Etudes pour l'Obtention du Deuterium).
Location: Paris.
Type: A society formed by the CEA and four private companies: ONIA (Office Nationale des Industries Azotées), Société Air Liquide, Compagnie Française de l'Eau Lourde, and SNPA (Société Nationale des Pétroles d'Aquitaine).
Principal officer: J. Fauveau.
Interests and activities: Research and fabrication of deuterium and heavy water by all processes other than liquification.

C. REACTORS

1. Name: Zoe (or EL–1).
Location: Fontenay-aux-Roses Laboratory.
Type: Natural uranium, heavy water.
Power: 150 kilowatts (heat).
Flux: 10^{12} neutrons per square centimeter per second.
Fuel: 2 tons natural uranium; originally ran with UO_2 (3 tons).
Built by laboratory staff.
Status: Built in 1948 for 5 kilowatts; power raised in 1953 by providing D_2O coolant.

2. Name: P–2 or EL–2.
Location: Saclay.
Type: Natural uranium, heavy-water research reactor.
Power: 2.5 megawatts (heat).
Flux: 10^{13} neutrons per square centimeter per second.
Fuel: 3 tons natural uranium, canned in magnesium.
Built by laboratory staff.
Status: Started operating in 1952.
Additional comments: Coolant is CO_2 at 10 atmospheres. Reactor is used for research and the production of radioisotopes.

3. Name: EL–3.
Location: Saclay.
Type: Slightly enriched, heavy-water test reactor.
Power: 15 megawatts.
Flux: 10^{14} neutrons per square centimeter per second.
Fuel: Slightly enriched uranium (1.4 percent) from England.
Built by Commissariat, prime contractor being Groupe Loire-Penhoët.
Status: Went critical July 1957.
Additional comments: Use D_2O (from the United States) as coolant; exchanges heat with H_2O. Graphite reflector and shielding is cooled by circulating air through enormous underground passageways. Water valves can isolate the building in case of release of radiation.

4. Name: Proserpine.
Location: Saclay.
Type: Homogeneous plutonium research reactor.
Power: 1 watt (heat).
Flux: 5×10^7 neutrons per square centimeter per second.
Fuel: 300 grams plutonium in the form of plutonium sulfate dissolved in 10 liters of light water.
Built by Saclay staff.
Status: Came into operation in March 1958.
Additional comments: Plutonium was extracted from uranium irradiated in EL–2.

5. Name: Aquilon.
Location: Saclay.
Type: Critical assembly for lattice studies with water.
Power: 1 watt (heat).
Flux:
Fuel: Variety of fuel types and arrangements.
Built by Saclay staff.

Status: Came into operation in 1956.
Additional comments:
6. Name: Minerve/Athena.
Location: Fontenay-aux-Roses Laboratory.
Type: A test pile (for determining purity of nuclear materials).
Power: 100 watts (heat).
Flux:
Fuel: 3 kilograms enriched uranium.
Built by laboratory staff.
Status: To be in operation in 1958.
Additional comments: To be used for cross-section studies; ordinary water or graphite would serve as moderator. No coolant.
7. Name: Triton.
Location: Fontenay-aux-Roses Laboratory.
Type: Swimming-pool research reactor.
Power: 1 megawatt (heat).
Flux: 10^{13} neutrons per square centimeter per second.
Fuel: 20 percent enriched MTR-type fuel elements (from B&W).
Built by laboratory staff.
Status: Under construction; to be in operation in 1958.
Additional comments:
8. Name: Mélusine.
Location: Grenoble.
Type: Swimming-pool research reactor.
Power: 1 megawatt (heat).
Flux: 10^{13} neutrons per square centimeter per second.
Fuel: 20 percent enriched MTR-type elements (from B&W).
Built by:
Status: Construction begun; to come into operation in 1958.
Additional comments: To be used for shielding studies and training of students.
9. Name: Pile Chaude (Brenda).
Location: Undesignated.
Type: A high-temperature, gas-cooled research reactor.
Power: Low.
Flux:
Fuel: Enriched uranium.
Built by:
Status: Under study by the Saclay staff, in close cooperation with SNECMA (the French nationalized aviation industry).
Additional comments: BeO would be used as moderator.
10. Name: The Q–244 reactor.
Location:
Type: Prototype reactor for submarine propulsion.
Power:
Flux:
Fuel: Enriched uranium (if available).
Built by:
Status: Under construction:
Additional comments: This reactor is being developed for installations in France's first nuclear-powered submarine (Q–244), a 5,000-ton craft. The moderator and coolant would be pressurized heavy water; a school for atomic marine propulsion has been established at Cherbourg.
11. Name: G–1.
Location: Marcoule Laboratory.
Type: Natural uranium and graphite.
Power: 40 megawatts (heat).
Flux: 5×10^{12} neutrons per square centimeter per second.
Fuel: 100 tons natural uranium slugs canned in magnesium.
Built by the Commissariat, the prime contract being with SFAC (Société Forges et Ateliers du Creusot).
Status: Went into operation early in 1956.
Additional comments: Air-cooled pile very similar to Brookhaven. First of a series of reactors built primarily for plutonium production. Expected to produce 12 kilograms plutonium per year. A generator has been added to produce 5 megawatts electrical power (but reactor consumes 8 megawatts). In October

1956 the cladding of one of the fuel elements caught fire and burned, apparently as a result of improper loading which blocked the cooling duct. It is now in operation producing 36 megawatts (heat) up, it was necessary to operate the reactor at low power.

12. Name: G–2 and G–3.

Location: Marcoule Laboratory.

Type: Natural uranium and graphite.

Power: 150 megawatts (heat), 30 megawatts (electrical) each.

Flux: 2×10^{13} neutrons per square centimeter per second.

Fuel: 120 tons natural uranium slugs each, canned in magnesium.

Built by the Commissariat, the prime contract being with SACM (Société Alsacienne de Constructions Mechaniques).

Status: G–2 to come into operation late in 1958; G–3, 6 months later.

Additional comments: These reactors constitute improved versions of G–1, incorporating CO_2 as coolant at 15 atmospheres. Major differences from Calder Hall reactors are lower power, horizontal channels, discharging in course of operation, prestressed concrete pressure vessel. Together, G–2 and G–3 are expected to produce roughly 100 kilograms of plutonium per year.

13. Name: EDF–1.

Location: Avoine, near Chinon.

Type: Natural uranium and graphite.

Power: 60 megawatts (electrical).

Flux: 4×10^{13} neutrons per square centimeter per second.

Fuel: 130 tons natural uranium.

Built by Electricité de France; the Commissariat will provide only the graphite and the uranium.

Status: To come into operation in 1959.

Additional comments: France's first all power nuclear plant will be housed in a concrete sphere of 187 feet diameter. Co_2 cooled at pressure of 25 atmospheres. EDF–2 is planned to provide 100 megawatts power, come into operation in 1962. Both EDF–1 and EDF–2 will have the fuel element channels vertical.

D. FUTURE PLANS; GENERAL COMMENTS

1. Intense interest in the utilization of plutonium as fuel in reactors; present plans are for the construction by 1965 of a plutonium power breeder reactor.

2. Appreciable interest in the sodium-graphite and organic moderated types of reactors; experimental work is underway at Saclay on both of these approaches. Prototype reactors are planned for 1961.

3. Interest also in studying a natural uranium, organic moderated prototype reactor, cooled by compressed gas.

4. A small experimental study program is underway in the field of boiling homogeneous reactors.

5. Future EDF reactors may be designed to operate with slightly enriched uranium fuel in order to permit somewhat greater compactness and higher operating temperatures.

6. Budget for present 5-year plan (1957–61) is 375 billion francs (approximately 1 billion United States dollars). Of this amount, 25 billion francs is earmarked as the French contribution toward a U–235 isotope separation plant.

7. Plans for the construction of a 40,000-ton nuclear-powered prototype tanker have been announced. Consideration is being given to the use of a gas-cooled, pressurized water or boiling water reactor in the vessel.

GERMANY (WEST)

A. RAW MATERIALS

B. PRINCIPAL ORGANIZATIONS AND LABORATORIES

1. Name: Bundesministerium fuer Atomkernenergie und Wasserwirtschaft (Federal Ministry for Atomic Energy and Water Resources).

Location: Bad Godesberg.

Type: A Federal governmental organization with certain designated responsibility for directing atomic energy activities in West Germany.

Principal officers: Minister, Siegfried Balke; Deputy Minister, Grau; director for law, administration, and management (department 1), Cartellieri; director for research, techniques, and radiation protection (department 2), Walther Schmurr.

Interests and activities: Direction and administration of the West German atomic energy program under the complete or partial responsibility of the Federal Government.

2. Name: Karlsruhe Reactor Station (under construction).

Location: Karlsruhe.

Type: A joint governmental-industrial research center.

Principal officers: Director of station and institute for nuclear physics and reactor techniques. Karl Wirtz; director, radiochemistry, W. Seelmann-Eggebert; isotope separation, E. W. Becker; radiation protection and biology, K. G. Zimmer.

Interests and activities: Research on atomic energy. Facilities will include a natural uranium, heavy-water research reactor (FR–2); institutes for neutron physics and reactor technology, radio chemistry, isotope separation, isotopic distribution and radiation protection and biology.

3. Name: North Rhine-Westphalia Research Center (planned).

Location: Stetternich Forest near Juelich.

Type: A nuclear research center.

Principal officer: Director, Leo Brandt.

Interests and activities: Nuclear research with the following equipment: A Merlin swimming-pool research reactor; a DIDO materials-test reactor; institutes for medicine and biology, agriculture, radiochemistry, reactor construction, controlled fusion and isotope separation.

4. Name: RWE (Rheinische-Westphalia Elektrizitaetsgesellschaft).

Location: Essen.

Type: State power group.

Principal officers:

Interests and activities: Acquisition of a 15-megawatt (electrical) boiling-water reactor to be installed at Kahl; also reportedly asking for bids on a 200- to 250-megawatt (electrical) reactor.

5. Name: AVR (Arbeitsgemeinschaft Deutscher Energieversorgungsunternehmen zur Vorbereitung der Errichtung eines Leistungsversuchsreactors).

Location:

Type: A nine-city utility group in northwest Germany.

Principal officers:

Interests and activities: The acquisition of a quasi-homogeneous gas-cooled graphite moderated reactor of 15 electrical megawatts; order placed with Brown-Boveri-Krupp Co.'s. (See below.)

6. Name: Gesellschaft fuer die Entwicklung der Atomkraft in Bayern (Society for the Development of Atomic Power in Bavaria).

Location: Munich.

Type: Society composed of six members: State of Bavaria, Bayernwerk, Farbewerk Hoechst, Grosskraftwerk Franken, Innwerk, and Isar-Amper Werk.

Principal officers: President, Karl Schwarz; vice president, Leonard Wolf.

Interests and activities: The acquisition of an atomic powerplant for Bavaria.

7. Name: Studiengesellschaft fuer Kernenergieverwaltung im Schiffbau und Schiffahrt (Study Group for the Administration of Atomic Energy in Shipbuilding and Transportation).

Location: Geesthacht, near Hamburg.

Type: Society of companies interested in the utilization of atomic energy in shipbuilding and shipping.

Principal officer: Manager, Prof. Dr. Erich Bagge.

Interests and activities: An active group under the direction of Prof. Kurt Illies, of Hanover Technical Academy, developed the design of a pressurized-water reactor and a gas-cooled model connected to a gas turbine to be used for the propulsion of a 10,000 shaft horsepower tanker. The reactors would have an installed capacity of 40 megawatts. There is also strong interest here in the development of propulsion reactors for aircraft.

8. Name: Studiengesellschaft fuer Kernkraftwerke GambH.

Location: Hanover.

Type: Group of electrical companies, including VEW (Vereinigte Elektrizitaetswerke Westfalen-AG of Dortmund), Preussische Elektrizitaets AG of Hanover; Hamburgische Elektrizitaetswerke AG in Hamburg; Nordwestdeutsche Kraftwerke AG in Hamburg.

Principal officers: Directors, Dr. Ludwig Spennemann (VEW) and Erhard Keltsch (Nordwestdeutsche Kraftwerke AG).

Interests and activities: Acquisition of an atomic power station for northwest Germany of 100 megawatts.

C. REACTORS

1. Name: FRM.

Location: Near Munich (Garchinger Heide).

Type: Swimming-pool research reactor.
Power: 1 megawatt (heat).
Flux: 10^{13} neutrons/per square centimeters/per second.
Fuel: 20 percent MTR-type elements (6 kilograms); fabricated by B&W.
Built by: AMF Atomics for the Technical University.
Status: Came into operation October 1957.
Additional comments: This reactor is housed in an impressive egg shaped dome, some 100 feet in height and only 4 inches in thickness. It will primarily be used by the Technical University for research and training purposes under the direction of Dr. Heinz Maier-Leibnitz, but will also be available to members of the university and of the Max Planck Institute (which, together with Heisenberg and much of his staff, will be transferred from Gottingen to Munich).
2. Name: FR–2.
Location: Near Karlsruhe.
Type: Natural uranium, heavy-water research reactor.
Power: 12 meagawatts (heat).
Flux: 3×10^{13} neutrons/per square centimeters^2/per second.
Fuel: Uranium cylinders, aluminum clad; fabrication by Degussa.
Built by: This is an all-German effort: D_2O from Farbewerke Hoechst; for State of Baden Württemberg.
Status: Under construction; to be completed in 1959.
Additional comments:
3. Name: FRF.
Location: Frankfurt.
Type: Water-boiler research reactor.
Power: 50 kilowatts (heat).
Flux: 10^{12} neutrons/per square centimeters/per second.
Fuel: Uranyl sulfate solution.
Built by: Atomics International (NAA) for University of Frankfurt and Technical University of Darmstadt.
Status: Came into operation January 1958.
Additional comments: Together with its identical twin for Berlin (see below) it comprises a "package deal" which was ordered at a reduced price from NAA. Both will be used primarily for radiochemistry, medical, and general nuclear research, production of radioisotopes, etc.
4. Name: FRB.
Location: West Berlin.
Type: Water-boiler research reactor.
Power: 50 kilowatts (heat).
Flux: 10^{12} neutrons per square centimeter per second.
Fuel: Uranyl sulfate solution.
Built by: Atomics International (NAA) for Institute for Nuclear Research.
Status: Scheduled to come into operation in 1958.
Additional comments: The nuclear research facilities are being designed and will be supervised by Pintsch Bamag, AG.
5. Name: FRH.
Location: Geesthacht, near Hamburg.
Type: Swimming-pool research reactor.
Power: 12 megawatts (heat).
Flux: 10^{13} neutrons per square centimeter per second.
Fuel: 20 percent enriched uranium (6 kilograms) fabricated by B&W.
Built by: Babcock & Wilcox for Gesellschaft fuer Kernenergieverwaltung im Schiffbau und Schiffahrt.
Status: To come into operation in 1958.
Additional comments: Operated jointly by the four German coastal states.
6. Name:
Location: Stetternich Forest near Jülich.
Type: Merlin swimming-pool research reactor.
Power: 5 megawatts (heat).
Flux: 10^{13} neutrons/per square centimeter^2/per second maximum.
Fuel: 30 kilograms of 90 percent enriched uranium; uranium aluminum alloy.
Built by: AEI-John Thompson (London) for (State of) North Rhine-Westphalia.
Status: Order has been placed.
Additional comments: This reactor and the Dido-type reactor (see below) will be used by the staffs of the Universities of Cologne, Bonn, and Aachen, as well as by private industry in this region.

7. Name:
Location: Stetternich Forest near Jülich.
Type: Dido–type materials-testing reactor.
Power: 10 megawatts (heat).
Flux: 10^{14} neutrons per square centimeters per second.
Fuel: Enriched uranium; uranium aluminum alloy, aluminum clad.
Built by: Head Wrightson & Co. (London) for (State of North Rhine-Westphalia).
Status: Reported to be ordered.
Additional comments:
8. Name: RWE Atomic Power Station.
Location: Kahl am Main, near Frankfurt.
Type: Boiling-water demonstration power reactor.
Power: 15 megawatts (electrical).
Flux:
Fuel:
Built by: Contract awarded for AEC/IGE, June 1958.
Status: Scheduled 1960.
Additional comments: This large nuclear-research center will be half paid for by the Federal Republic.
9. Name:
Location: In area of Electromark, Hagen.
Type: Quasi-homogeneous, gas-cooled graphite moderated reactor experiment.
Power: 15 megawatts (electrical).
Flux:
Fuel: Spherical uranium carbide particles interspersed in a graphite matrix to form lumps roughly the size of potatoes.
Built by Krupp (Essen) and Brown-Boveri (Mannheim) for AVR.
Status: Ordered.
Additional comments: In this concept (essentially a modification of the Daniels pile) the size of the uranium-oxide particles would be made sufficiently small so that the fission products would end up in the graphite. Removal of the fission products would then be accomplished by pulverizing the lumps and separating the uranium oxide from the graphite by an upward air current. The advantages of this reactor concept include—

(*a*) The possibility of high-temperature operation (1,000° C.);
(*b*) Minimizing costs for the fabrication and processing of the fuel;
(*c*) Inherent reactor safety and ease of control (by simply changing the loading and the coolant flow).

A thorium-breeding cycle could be introduced by mixing in elements of thorium carbide and graphite. If this experiment is successful, a 100-electrical megawatt powerplant would be built on this concept subsequently.

D. FUTURE PLANS

1. The Federal Ministry for Atomic Energy has announced that the German AEC has approved a program for the development and construction by 1965 of the following power-reactor projects having a total output of 500,000 kilowatts (electric):

(*a*) Advanced gas-cooled, graphite moderated reactor with natural uranium to be built by Krupp (Essen) and Brown-Boveri (Mannheim) for AVR.
(*b*) Heavy-water moderated and cooled reactor with natural uranium to be built by Siemens Schuckert (Erlangen).
(*c*) Light-water moderated and cooled reactor with weakly enriched uranium, to be built by AEG.
(*d*) Advanced high-temperature, gas-cooled reactor with enriched uranium to be built by the German Babcock & Wilcox Co.

The Federal Ministry has also mentioned its proposal to expand the proposed nuclear-power program to 1,500 megawatts (electrical) if nuclear-power reactors are found to be economically attractive and the financing of the program can be guaranteed.

2. Other projects, which are being planned by organizations other than the Federal Government are as follows:

(*a*) A closed-cycle boiling-water demonstration power reactor; 15 megawatts (electrical) for RWE.
(*b*) The Arbeitsgemeinschaft zum Stadium der Errichtung eines Kernkrafwerks in Baden-Württemberg is asking for bids on a 200- to 235-megawatts (electrical) nuclear-powered reactor.

(*c*) The Rheinisch-Westfälisches Elektrizitatswerk A. G. is also reportedly interested in a 200- to 225-megawatt (electrical) nuclear-power reactor.

(*d*) A second and larger nuclear reactor for ship propulsion studies is being planned by the Gesellschaft fuer Kernenergieverwaltung im Schiffbau and Schiffahrt of Hamburg.

(*e*) Siemens Schuckert (of Erlangen) is considering the acquisition of an Argonaut-type training reactor from the United States. Involves 4 kilograms of 20 percent enriched U–235.

(*f*) The city of Oberhausen (in Ruhr, headquarters of German Babcock & Wilcox) plans reactor to provide process heat for industry and space heat for housing.

(*g*) In the State of Baden Wurtenburg a group is seriously interested in acquiring a Calder Hall-type of reactor.

(*h*) VEBA (Electrical Holding Co. involving Preussag, Preussenelektra, Hibernia AG) plans to establish a nuclear laboratory; work will be carried out in conjunction with either Hannover or Darmstadt Technical University.

(*i*) The Technical University at Saarbrucken is seeking an experimental reactor.

ITALY

A. RAW MATERIALS

1. Uranium: Uranium-ore deposits have been discovered on the Italian side of the Mount Blanc Range, the main vein being in the Entreves area. Areas in Lazio, Reggio Calabria, Campania, Apulia, Sicily, and Sardinia are believed to be fairly promising, but little progress can be expected until legislation controlling the exploration and mining of radioactive minerals is passed.

2. Oil and coal: Fairly substantial deposits of rather heavy-grade crude oil have been found in Sicily. Production will reach 1.5 million tons this year and should pass 2 million tons in 1957. (Italy's total requirements are about 11.5 million tons annually.) Coal resources are of a negligible amount.

3. Hydropower: Italy's ultimate hydropower potential is rated at 55 billion kilowatt-hours annually. About 40 billion are either harnessed or will be harnessed when current plant construction is completed. Virtually all economic hydroelectric potentials expected to be in use by 1965.

B. PRINCIPAL ORGANIZATIONS AND LABORATORIES

1. Name: CNRN (Comitato Nazionale per le Ricerche Nucleari).
Type: National Committee for Nuclear Research.
Principal officers: President, B. Focaccia; vice presidents, A. Angelini and E. Amaldi; secretary, F. Ippolito.
Interests and activities: Responsible for nuclear research throughout Italy.

2. Name: CISE (Center for Nuclear Information, Studies, and Experiments).
Location: Milan.
Type: Private society supported by the following companies: Montecatini, Fiat, Edison, Pirelli, Sade, Terni, and others, including a Government-owned group called FINSAS, which includes IRI, ENI, AGIP, and others.
Principal officers: President, de Biasi; managing director, F. Nordio.
Interests and activities: Extensive laboratory facilities in Milan, including a small plant for refining uranium ore.

3. Name: Frascati National Laboratory.
Location: Frascati, 12 miles south of Rome.
Type: A governmental basic research laboratory.
Principal officers:
Interests and activities: Atomic-energy research; 1-megawatt swimming-pool reactor. Has 1 Bev-electron synchrotron, hot and cold laboratories.

4. Name: Ispra Nuclear Center.
Location: Near Varese on the shore of Lake Maggiore.
Type: Applied research.
Principal officer: Carlo Salvetti, general manager.
Interests and activities: Applied research; CP–5-type heavy-water research reactor.

5. Name: SicEdison.
Location: Milan.
Type: Chemical subsidiary of Edisonvolta.
Principal officer: Ciriello.
Interests and activities: Chemical reprocessing.

6. Name: Selni (Societa Elettronucleare Italiana).
Location: Rome.
Type: Recently modified, now 85 percent privately owned (with majority held by Edison), and 15 percent state owned.
Principal officers: G. Valerio and V. de Biasi.
Interests and activities: Selni will concentrate its activities in northern Italy and will manage the Edisonvolta reactor.

7. Name: IRI (Instituto per la Riconstruzione Industriale).
Location: Rome.
Type: Very large Government-controlled, bank-like corporation, composed of a great many nationalized companies.
Principal officers: President, A. Fascetti; vice president, Saraceno.
Interests and activities: Mostly handled by subsidiary Finelettrica: also, with ENI, the acquisition of a nuclear station for southern Italy. (See SIMEA.)

8. Name: Finelettrica.
Location: Rome.
Type: Subsidiary of IRI responsible for electrical power.
Principal officers: Director general, Bianchi; Zenari and Angelini.

Interests and activities: See under SENN.

9. Name: SENN (Societa Elettronucleare Nazionale).

Location: Rome.

Type: Corporation 85 percent owned by IRI (mostly through Finelettrica) and 15 percent owned by private companies.

Principal officers: President, Matteini; managing director, G. Angelucci.

Interests and activities: Has signed a contract with the Internuclear Co. (Missouri) and Kennedy & Donkin for consulting and engineering services in connection with the selection of a large (150 megawatts) reactor which SENN plans to build. Through a study project known as project ENSI (Energia Nucleare Sud Italia), a panel of experts from the United States, United Kingdom, and Italy will select the type of reactor to be built. Funds will be supplied part by the World Bank. The reactor is scheduled for completion in 1962.

10. Name: ENI (Ente Nazionale Idrocarburi) (National Hydrocarbon Trust).

Location: Rome.

Type: Large Government-owned holding company for the exploration and exploitation of sources of petroleum and natural gas. Chemical derivatives from these natural resources; governmental responsibility for energy resources.

Principal officer: E. Mattei.

Interests and activities: See under AGIP Nucleare.

11. Name: AGIP Nucleare.

Location: Milan.

Type: Subsidiary of ENI responsible for atomic energy matters; a holding company to promote new nuclear activity through subsidiary companies.

Principal officers: President, E. Mattei, managing director, G. Martinoli; director, M. Quojani.

Interests and activities: Plans to purchase series of large (more than 100 electrical megawatts) nuclear reactors from the United States or England. Its first reactor will be of the Calder Hall type. The British Atomic Energy Authority will provide engineering assistance.

12. Name: Somiren (Societa Minerali Radioattivi Energia Nucleare).

Location: Milan.

Type: A subsidiary of AGIP Nucleare involved in prospecting for minerals and treatment of ores.

Principal officers: G. Martinoli and Borello.

Interests and activities: Exploration for and treatment of uranium ores; possible interest in fabrication of nuclear fuels.

13. Name: SIMEA (Societa Italiana Meridionale per l'Energia Atomica).

Location: Rome.

Type: Subsidiary, 75 percent owned by ENI and 25 percent by IRI; interested in nuclear-power production in south of Italy.

Principal officers: G. Martinoli and M. Quojani.

Interests and activities: Plan installation of Calder Hall-type reactor of about 200 electrical megawatts in southern Italy.

14. Name: Fiat.

Location: Turin.

Type: Private company, particularly involved in production of automobiles and aircraft.

Principal officers: President, V. Valletta; managing director, Bono.

Interests and activities: Will use the facilities of SORIN, but will also have its own nuclear-research laboratory. Fiat has signed a licensing agreement with Westinghouse, under which it will manufacture components and ultimately entire reactors with technical assistance from Westinghouse.

15. Name: Montecatini.

Location: Milan.

Type: Private company engaged in chemicals and mining.

Principal officers: Faina, Giustiniani, Castellani.

Interests and activities: Chemical processing and fuel fabrication. Will use facilities of SORIN.

16. Name: SORIN (Societa Ricerche Impianti Nucleari).

Location: Milan.

Type: A subsidiary owned half by Fiat and half by Montecatini.

Principal officers: President, Valletta; vice president, Castellani; technical directors, G. Cesoni and Orsoni.

Interests and activities: Establishment of a nuclear center near Chivasso (25 miles east of Turin); acquisition from AMF of a 1- to 5-megawatt swim-

ming-pool reactor; purchase of a 134 electrical megawatt pressurized-water reactor of the Yankee type, and of a second unit as well.

17. Name: CAAI (Centro Aeronautico and Atomico Italiano).
Location: Rome.
Type: Private, nonprofit firm (in the process of formation); to coordinate industrial activity in atomic energy in Italy.
Principal officers: Di Bella.
Interests and activities: Nuclear research and development; construction of power and propulsion reactors; use of radioisotopes.

C. REACTORS

1. Name:
Location:
Type: Pressurized-water reactor (of the Yankee type).
Power: 134 megawatts (electrical); a superheater is planned to raise the total capacity to 225 electrical megawatts.
Flux:
Fuel: 3 percent-enriched uranium elements.
Built by Westinghouse for SELNI.
Status: Contract has been signed.
Additional comments:
2. Name:
Location: SORIN Nuclear Center at Chivasso (25 miles east of Turin).
Type: Pool-type research reactor.
Power: 1 megawatt (heat), to be raised later to 5 megawatts.
Flux:
Fuel: 20 percent-enriched uranium elements.
Built by American Machine & Foundry Co.
Status: Contract signed with AMF.
Additional comments:
3. Name: ISPRA–1.
Location: CNRN site at Ispra, north of Milan.
Type: Tank-type research reactor.
Power: 5 megawatts (heat).
Flux:
Fuel: 20 percent-enriched MTR-type fuel elements.
Built by American Car & Foundry, Inc.
Status: To come into operation in 1958.
Additional comments: Heavy-water moderated and cooled.
4. Name:
Location: Rome.
Type: Boiling-water reactor.
Power: 12.5 megawatts (electrical).
Flux:
Fuel:
Built by International General Electric Co. for ACEA (the Rome communal water and power company).
Status:
Additional comments: To provide electricity for the facilities at the 1960 Olympic Games in Rome.
5. Name:
Location: University of Milan.
Type: Water-boiler research reactor.
Power: 50 kilowatts.
Flux:
Fuel: Enriched uranyl sulphate solution.
Built by Atomics International.
Status: To be completed in 1958.
Additional comments:
6. Name: SENN project.
Location:
Type: Undecided.
Power: 150 megawatts (electrical).
Flux:
Fuel:
Built by: Bids being considered.
Status: To come into operation in 1962.

Additional comments:
7. Name: AGIP nuclear SIMEA project.
Location:
Type: Natural uranium, gas-cooled reactor.
Power: 200 electrical megawatts.
Flux:
Fuel:
Built by: NPPC.
Status:
Additional comments:

FUTURE PLANS

1. Three thousand megawatts to be installed by 1965–67.
2. University of Rome planning a swimming-pool reactor.
3. University of Milan planning a subcritical assembly.
4. University of Bologna planning a subcritical assembly.
5. University of Cagliari (Sardinia) is constructing a subcritical assembly.

THE NETHERLANDS

THE NETHERLANDS

A. RAW MATERIALS

1. Uranium: No sources of importance.
2. Oil and coal: Present production (12 million tons coal per year and small amount crude oil) accounts for about half of energy requirements in the Netherlands; the remainder is imported.
3. Hydropower: Essentially none.

B. PRINCIPAL ORGANIZATIONS AND LABORATORIES

1. Name: RCN (Reactor Centrum Nederland).
Location: The Hague.
Type: Organization founded by the Government with equal representation by the Government, by science (in the form of FOM), and by industrial groups and electricity producers.
Principal officers: Technical director, Dr. W. A. DeHaas; administrative director, Dr. W. Reyseger.
Interests and activities: To acquire knowledge and experience in the nuclear field. Is developing and will operate the reactor site at Petten. With the Norwegians, operates the JENER establishment at Oslo (see Norway); supports research projects at KEMA and at various university centers throughout Holland.

2. Name: FOM (Fundamenteel Onderzoeks der Materie).
Location: Utrecht.
Type: A scientific group for the purpose of coordinating nuclear research.
Principal officers:
Interests and activities: Major interest is pure science; among other subjects being actively studied, programs have been instigated in the field of controlled fusion and in isotope separation by ultracentrifuge.

3. Name: National Research Center.
Location: Near Petten (30 miles north of Amsterdam on the North Sea coast).
Type: To be the central reactor laboratory of RCN.
Principal officers:
Principal facilities: A materials-testing reactor (under construction).

4. Name: KEMA Laboratories.
Location: Arnhem.
Type: Utility research company jointly owned by the Provincial powerplants for the testing of electrotechnical materials.
Principal officers: Director, J. C. van Staveren; director of research, J. J. Went.
Principal facilities: The Suspop reactor.

5. Name: SEP (Cooperating Electricity Producers).
Location: Arnhem.
Type: A cooperative association of electricity producers (municipal and Province owned).
Principal officers: Chairman, E. L. Kramer; secretary, J. J. Went; H. F. A. Roodenburg.
Interests and activities: Has formed an evaluation committee to study the types of reactors which should be considered for construction in the Netherlands.

6. Name: Marine Propulsion Study Group.
Location:
Type: Group set up under the auspices of the RCN, composed of shipping companies, the TNO (Central Netherlands Organization for Applied Scientific Research), and several engineering companies (including Werkspoor and Stork, NV).
Principal officers:
Interests and activities: To study the feasibility and economics of nuclear power.

C. REACTORS

1. Name:
Location: Technical University, Delft.
Type: Swimming-pool reactor.
Power: 100 kilowatts.
Flux:
Fuel: 20 percent-enriched MTR-type elements (B&W).
Obtained from ACF Industries, Inc.

Status: Went critical May 1957.
Additional comments: Was located initially at Amsterdam for exhibit in the fair; was subsequently moved to Delft.
2. Name:
Location: Netherlands Reactor Center (Petten).
Type: Pool-type test reactor (ORR-type).
Power: 20 megawatts (heat).
Flux: More than 10^{14} neutrons per square centimeter per second.
Fuel: 90 percent-enriched uranium.
Obtained from: ACF Industries, Inc.
Status: Completion in 1958.
Additional comments:
3. Name: Suspop (Suspension power only pile).
Location: KEMA Laboratories (Arnhem).
Type: Quasi-homogeneous suspension reactor.
Power: 250 kilowatts.
Flux:
Fuel: 20 percent-enriched uranium (from England) in the form of small pellets of UO_2 suspended in water.
Built by KEMA staff.
Status: A small subcritical assembly is already in operation; the reactor experiment itself, a 250-kilowatt unit, is under assembly.
Additional comments: Active carbon is added to the UO_2 fuel slurry circuit to aid in the removal of the fission fragments. A 10- to 30-megawatt unit would be the next step. Design is also underway for a dry suspension reactor.
4. Name:
Location: North Brabant Province in south-central Holland.
Type: Undecided.
Power: 150 megawatts (electrical).
Flux:
Fuel:
Built by: To be purchased abroad.
Status: In planning stage; to be completed by 1962.
Additional comments:

Appendix 5

Statement of Atomic Energy Commission on Status of Foreign Reactor Programs, July 1, 1958

This material is submitted in response to a letter from the chairman of the Joint Committee on Atomic Energy, dated July 9, 1958 (see p.—). In that letter we are requested to bring up to date material furnished the committee as of July 1, 1957, on the status of foreign reactor programs for inclusion as an appendix to the Euratom hearings. The following information, as in the case of the material submitted last year, is drawn largely from unclassified publications and from visits of AEC officials to some of the nations covered.

The report includes discussion of reactor programs of countries other than the United States and Communist countries. The countries are discussed in alphabetical sequence within three major geographic regions. The scope of some of the programs discussed is relatively small at this time when compared with other national programs such as the United Kingdom, Canada, and Euratom countries, but may become increasingly significant with passage of time. All of the programs are, of course, likely to undergo changes in this formative period of the atomic energy industry.

Virtually all of the countries discussed have signed, or are negotiating, bilateral agreements with the United States. The United States has also given strong support to the establishment of the International Atomic Energy Agency first proposed by President Eisenhower to the U. N. General Assembly on December 8, 1953.

The last submission on the status of foreign reactor programs discussed Euratom and the development of atomic energy under the aegis of the Organization for European Cooperation as being in the formative stages. Since that time considerable advances have been made in the programs of both Euratom and the OEEC. Details of the reactor program under Euratom were submitted to the Joint Committee by the Chairman of the AEC by letter dated June 23, 1958, and, therefore, further discussion here concerning Euratom is not con-

sidered necessary. Nuclear energy developments within the framework of OEEC, however, are discussed in further detail in the European section which follows as well as the national atomic energy programs of the six countries comprising Euratom. It should be mentioned, however, that as the proposed Euratom program develops, certain changes might become necessary or desirable in the planning of their national programs.

EUROPE

OEEC

The Organization for European Economic Cooperation which was established in 1948 has, since 1955, appointed various committees and working parties to investigate the scope of work which might be undertaken and methods of cooperation among the member countries in the development of atomic power projects. Its present membership includes:

Members: Austria, Belgium, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, The Netherlands, Norway, Portugal, Sweden, Switzerland, Turkey, United Kingdom.

Associate members: Canada, United States.

A permanent body known as the Steering Committee for Nuclear Energy was assigned the responsibility both for submitting proposals and implementing decisions regarding the institutions which should be established to carry out the joint action of the member states.

On February 1, 1957, the European Nuclear Energy Agency was established within the framework of the OEEC. The tasks assigned to the new agency are to be carried out primarily by, or under the supervision of, the steering committee or restricted groups of the steering committee composed of representatives of the countries participating in a joint undertaking. The primary function of the ENEA is "to further the development of the production and uses of nuclear energy for peaceful purposes by the participating countries, through cooperation between those countries and a harmonization of measures on the national level."

The natural uranium, boiling heavy water project being constructed at Halden 60 miles south of Oslo has become the subject of a joint effort under ENEA auspices. Seven countries, for a 3-year period, will contribute personnel and finances toward the operation of the reactor and will benefit from the work accomplished. The United States is participating by having three technical men assigned to the project for varying periods over the next year.

ENEA is currently investigating the possibility of undertaking three joint ventures—(1) a natural uranium, heavy water project, probably in Sweden, (2) a high temperature, gas-cooled reactor, probably in the United Kingdom, (3) a homogeneous aqueous reactor. These projects would be operated on a basis similar to the Halden project—joint operation and financing.

Austria

The Austrian Study Co. is planning a $4 million research center near Vienna. The central feature will be a 5-megawatt tank type research reactor being constructed by AMF Atomics. A $350,000 grant on this project by the Commission, under the President's atoms-for-peace program and in accord with our research agreement for cooperation with Austria, was approved in May 1958. The reactor is scheduled to begin normal operation January 1, 1960.

Belgium

The rate of increase on electric power demand in Belgium is somewhat lower than in other western European countries. Nevertheless demand is expected to double by 1980. About that time it is expected that Belgian coal output will begin to decline, making it more imperative that energy demands be met by augmented imports or by atomic fuels. The latter is considered appropriate in many Belgian circles because Belgium has uranium resources in the Belgian Congo and because the cost of conventional power in Belgium is already so high as to make atomic power relatively more attractive than in most other places.

Belgonucleaire (an organization which manufactures reactor components, reprocesses nuclear fuels and trades in uranium) plans to construct five power reactors with a combined capacity of 550 megawatts. Four of the reactors will probably be converters and the fifth one, the last to go into operation, will, it is hoped, be a breeder reactor. Belgonucleaire hopes to decide on the type of its first converter reactor before the end of this year and plans to have it in operation in 1962. The first reactor may have as much as 140 megawatts capacity. Two years ago Belgonucleaire planned a program of 300 to 325 megawatts over the same period of time, but following the visit of a number of

Belgian atomic energy engineers and representatives of electrical power companies to the United States with the Euratom group in July 1957, it was decided to increase the program considerably.

Already in operation at the Mol Laboratory is the BR–1, an air-cooled, graphite, natural uranium research reactor. A high-flux engineering research reactor, BR–2, is scheduled to be added in 1959. Nuclear Development Corporation of America is doing the design work. It is believed that the reactor will be principally constructed in Belgium by Belgian personnel. The Mol center will also acquire the 11.5 megawatt Westinghouse pressurized water reactor originally planned for the Brussels World's Fair.

Belgium has already signed bilateral agreements with the United States and the United Kingdom for delivery of enriched uranium for power and research reactors. Information on breeder plants has been exchanged with Atomic Power Development Associates, sponsors of the fast breeder reactor being built in Michigan by the Power Reactor Development Co. Belgium is a member of Euratom.

Denmark

The United States has a research agreement with Denmark. In June 1956 construction was started on the new research center at Risoe, 30 miles west of Copenhagen. This center is in operation now and contains the following:

(*a*) 500-watt water boiler reactor purchased from Atomics International which has been in operation since August 1957.

(*b*) 5 megawatt tank-type reactor purchased from Foster-Wheeler and scheduled to go into operation in late 1958.

(*c*) 10 megawatt heavy water test reactor being purchased from Head Wrightson Processes, Ltd., England, presently under construction. Heavy water to be purchased from the United States.

(*d*) Related laboratories and other facilities.

France

The atomic energy program of France, after that of the United Kingdom, is the largest, most diversified and most advanced in Western Europe. The French, like the British, have been particularly interested in the development of gas cooled reactors (although their design concepts differ substantially from those of the British) as producers of plutonium and power.

Much French research has been directed toward the exploitation of plutonium as a reactor fuel. A plutonium production and nuclear power center is being developed at Marcoule. When complete, the Marcoule group will include three large reactors, G–1, G–2, and G–3, together with a plant for chemically reprocessing the fuels from these reactors. The G–1, an air-cooled, graphite moderated, natural uranium reactor similar to the Brookhaven research reactor, and generating 20–40 megawatts thermal and 5 megawatts electrical, went critical early in 1956. The G–2 went critical in July 1958. The G–3 is scheduled to begin operation within the next 6 months. Both G–2 and G–3 have a thermal output of approximately 150 megawatts and an electrical output of 30–40 megawatts. When working together, the three reactors are expected to feed approximately 60,000 megawatts into the electricity grid and to produce 100 kilograms of plutonium per year. The chemical reprocessing plant at Marcoule is being readied to begin operations using the first G–1 core. A high-flux testing reactor, the EL–3, which is moderated with heavy water obtained from the United States, went critical in July 1957 at Saclay.

Prior to the Suez crisis the French estimated that within a decade their energy requirements would force the use of other than conventional fuels. Suez underscored this eventuality even more sharply. France fortunately has its own resources of nuclear fuel—uranium in metropolitan France and thorium in Madagascar. In preparation for the needs of atomic power the Commissariat a l'Energie Atomique (CEA) and the state-owned utility Electricite de France (EDF) are jointly designing and building EDF–1, with an electrical capacity of 60 megawatts, in the Loire Valley. EDF–1 is to go into operation in 1959. EDF–2, with a capacity of 100 megawatts electrical, scheduled for operation in 1960, will be built on the same site. These reactors will be fueled primarily with uranium supplied by the CEA. In contrast to the reactors at Marcoule, they are designed for optimum output of power with plutonium as a byproduct. The site on the Loire River was selected by EDF because its remoteness from hydro and coal resources makes it one of the highest power cost locations in France.

The French have indicated that other reactor concepts are also under study. These include alternate systems of cooling such as liquid sodium used in the

United States sodium graphite type. They have also done some work on maritime and high temperature test reactors.

France has a comprehensive agreement for cooperation in power and research with the United States and is a member of Euratom.

Germany

In spite of the fact that nuclear research in the Federal Republic of Germany was delayed because of postwar restrictions there has been widespread activity in government, academic, and business circles relating to nuclear matters.

Presently planned activities run the gamut from university research centers to the building of large-scale power reactors. American built reactors will figure largely in several proposed nuclear research centers. At Munich the Technical University purchased from AMF Atomics a 1 megawatt swimming pool type reactor which went critical in October 1957. The Society for Utilization of Atomic Energy in Shipbuilding and Shipping, Hamburg, plans to bring into operation before the end of this year a swimming pool reactor, built by Babcock & Wilcox. Atomics International completed a water boiler research reactor for the University of Frankfurt which went critical in January 1958. The same firm has also built a similar reactor for West Berlin which is expected to go critical within the next few weeks. An Argonaut type training reactor has been proposed for the near future by Siemens-Schuckert, a large industrial firm.

The British firms of John Thompson and Head Wrightson & Co. are supplying a 5 megawatt swimming pool research reactor and a 10 megawatt materials testing reactor, respectively, to the State of North Rhine-Westphalia.

Various utility companies and combinations of companies are engaged in plans to establish power reactors or preliminary small size experimental installations. The RWE—Rheinisch-Westphalische Elektrizitatswerke—the large Essen utility company has awarded a contract for the design and construction of a 15 electric megawatt boiling water demonstration power reactor. This reactor is to be built by the Allgemeine Elektrizitats Gesellschaft and its affiliate International General Electric. Siemens-Schuckert is planning the construction of a 100 electric megawatt power reactor designed as a combination of the pressurized and boiling water concepts. A Rhine-Westphalian utility group known as A. V. R. proposes to construct a 15 electric megawatt quasi-homogeneous gas-cooled reactor which will be used for research and training as well as to produce electric power. This reactor is to be built by the German firms, Brown-Boveri, Krupp and DEGUSSA.

An industrial group in Frankfurt is undertaking design of a 100-electric-megawatt self-sustaining reactor with natural uranium makeup. Plutonium spiking is contemplated eventually. It is expected to be run initially with enriched-uranium spiking.

Still another 100-megawatt reactor is being proposed by a group of utilities under the leadership of Bayernwerke of Munich. Another utility combination is reported to be considering purchase of a large gas-cooled graphite reactor from the United Kingdom.

Germany has a comprehensive agreement for cooperation with the United States, providing enriched fuels for the more advanced power projects listed above and for an expanded research program. Germany is also a member of Euratom.

Greece

The Greek Atomic Energy Commission is planning the Democritus Nuclear Center near Athens, which will include a 1-megawatt swimming pool research reactor built by AMF Atomics, which is expected to go into operation in early 1959. A $350,000 grant has been made on this project, and the United States has recently approved another grant of $127,600 for Greece to assist in the acquisition of equipment and source material for a nuclear engineering instructional laboratory, the main feature of which will be a subcritical assembly. A research agreement for cooperation is in force with Greece.

Italy

In Italy various public and private organizations have been planning to acquire reactors. Societa Edison, which controls Edisonvolta of Milan, has issued a letter of intent to buy from Westinghouse a pressurized water reactor rated at 134 net electric megawatts. This reactor would be very similar to the reactor being built at Rowe, Mass., for the Yankee Atomic Electric Co. Other large nuclear powerplant projects reported to be contemplated in Italy include the SENN (Societa Elettronucleare Nazionale) project which involves a large

(150 electric megawatt) reactor to be financed in part by the World Bank and for which United States, British and French firms have submitted bids; and the Agip Nucleare project which involves the construction in southern Italy of a 200-electric-megawatt Calder Hall type reactor.

Italian research facilities are chiefly grouped at Ispra, about 40 miles from Milan. These facilities are under the jurisdiction of the National Committee for Nuclear Research (CNRN) which organizes and finances research for the Italian Government. A heavy water tank-type research reactor built by ACF is nearing completion at this laboratory. Additional research facilities are being planned for the University of Pisa, Polytechnic of Milan, the University of Rome, and other schools.

Italy has a comprehensive agreement for cooperation with the United States and is a member of Euratom.

The Netherlands

The lack of fuels, either fossil or nuclear, has spurred research in the Netherlands toward the development of large reactors for central station plants. Research work is undertaken by KEMA Laboratories at Arnhem. KEMA performs work for the Netherlands Reactor Center (RCN) which it in turn supports in cooperation with the Netherlands Government and other business and scientific organizations. KEMA operations have been primarily in the field of slurry reactor experiments and studies. A materials testing reactor built by ACF Industries, Inc., and which is a modified version of the Oak Ridge Research Reactor, is scheduled to come into operation this year.

Other nuclear research will be undertaken at the Delft technical school, where the swimming pool reactor from the atomic fair in Amsterdam is being installed. The Netherlands is also engaged in a joint undertaking with Norway at Kjeller in Norway on the 450-kilowatt natural uranium heavy water reactor.

The Netherlands has a comprehensive agreement for cooperation with the United States and is a member of Euratom.

Norway

A power agreement is in effect with the United States. The Norwegian atomic-energy program is under the aegis of the Institute for Atomic Energy. In 1951 the Joint Establishment for Nuclear Energy Research (JENER) was established by Norway and the Netherlands at Kjeller on the outskirts of Oslo. This facility has a 450-kilowatt natural uranium, heavy water research reactor which has been in operation since 1951, a pilot plant for chemical reprocessing and other laboratory facilities.

At Halden, 60 miles south of Oslo, a 10-megawatt boiling heavy water reactor using natural uranium in the first charge and slightly enriched unranium purchased from the United States in the second charge, is scheduled to become operational in late 1958. Sixteen tons of heavy water was purchased from the United States for this reactor.

Portugal

The Portuguese Junta has undertaken a nuclear center near Lisbon, which will include a 1-megawatt swimming pool research reactor being built by AMF Atomics, and expected to be in operation early in 1959. A $350,000 grant for this project has been approved. Cooperation with Portugal is carried on in accordance with the terms of our research agreement for cooperation.

Spain

The Spanish Junta's research center in Madrid will feature a 3-megawatt research reactor being completed by General Electric and expected to go into operation before the end of this year. A $350,000 grant of this project has been approved. Studies looking toward the application of nuclear energy to the production of electric power are being carried on in Spain. Cooperation in the power field will be carried on under the terms of our comprehensive research and power agreement for cooperation.

Switzerland

Private industry appears to be taking the lead in the development of atomic power in Switzerland. Reactor, Ltd., financed chiefly by some 140 private companies, but with some Government participation, has been active for some time. This company has rebuilt the Geneva exhibition reactor as a research reactor at Wuerenlingen, site of the company's research center. It went critical in the late spring of 1957. Reactor, Ltd.'s, second project at the same site is to be a heavy

water 12.5-megawatt (thermal) testing reactor of their own design, using British uranium and heavy water from the United States and Norway.

The Federal Institute of Technology in Zurich is now building a 5 electric megawatt natural uranium, heavy water pressurized reactor scheduled to be completed in late 1959. General Nuclear Engineering Co. is acting as design consultant. Several private Swiss firms are making plans for construction of experimental power reactors and the Universities of Geneva and Basle are purchasing AGN 211 and 201 research reactors respectively in the fall of 1958.

Further evidence of Swiss interest in power reactors is reflected in the power and research agreement for cooperation now in force with the United States. Swiss industry is interested in building reactors and components for export.

Sweden

A research agreement for cooperation is in effect between Sweden and the United States. The Swedish reactor program is guided by Aktiebolaget Atomenergie (Atomic Energy Co.), a semigovernment corporation to which private Swedish firms have contributed capital. Atomkomitten (Atomic Committee), a wholly governmental organization, deals with broad policy matters, including fundamental research programs. The same people frequently serve on both organizations.

A major reactor center is under construction at Studsvik, 80 miles south of Stockholm. The Atomic Energy Co. is locating a materials testing reactor (R–2) at this site, purchased from ACF Industries, Inc., which will go into operation in late 1958. Highly enriched uranium is being purchased and fabricated in the United States.

R–1, a small CP–3 type experimental pile built by the Atomic Energy Co., has been in operation in Stockholm since 1954. Design work is well advanced on two power reactors (R–3 and R–4) which will be built by the Swedes of the natural uranium, heavy water type. Six additional power reactors, primarily for district heating purposes, are planned to be constructed in the next 10 years.

United Kingdom

Emphasis in the United Kingdom program is on the natural uranium, gas-cooled, graphite moderated reactor. The role of the UKAEA in the nuclear-power industry is the further development and refinement of this reactor concept for commercial exploitation, although research in other reactor systems is also being done. British authorities have decided that this reactor concept is the most feasible one upon which the British can develop much-needed electrical power through the use of nuclear energy.

A significant statement was made recently by Sir Christopher Hinton, formerly a member of the UKAEA and now the head of the CEA, in which he indicated that the presently planned CEA reactors of the Calder Hall type would be adequate as base load plants, but that definite improvements had to be made in order to reduce costs if this particular type of reactor was to be successful. This reaction has resulted in speeding work on advanced gas-cooled reactor concepts.

In February 1955 the initial nuclear-power program was presented to Parliament calling for the installation of 1,500–2,000 megawatts of nuclear electrical generating capacity by 1965 at a cost of $840 million. The accomplishment of this goal would have meant a saving of 5 to 6 million tons of coal per year. In March 1957 Parliament was informed that in the light of technical progress during the 2 preceding years, the Government had decided to expand its original program and was now planning a program to achieve 5,000–6,000 megawatts of nuclear electrical capacity by 1965. The cost of this revised program would be $2,740 million and the coal savings would be 18 million tons annually. There have been recent revisions in this plan. It has now been decided to extend the date for accomplishment of these goals until 1966 because technical improvements have become essential in the reactors to be installed and, as a consequence, more funds need to be put into modernizing the existing coal-burning system to meet power needs until the technical improvements have been made. Another change which has occurred is the expectation that the 6,000-megawatt program will be achieved by 12 power stations instead of the original 16 to 19 stations contemplated inasmuch as increased power is anticipated from each of the reactors to be installed.

In addition to the gas-cooled, graphite moderated power reactors being constructed, the UKAEA has a number of research, materials testing, and experimental reactors in operation or under construction at its various facilities.

ASIA-AFRICA

Australia

A power agreement for cooperation between the United States and Australia came into force on May 28, 1957. Although the status of conventional sources of power in Australia is such that there is no prospect for use of nuclear power in the near future, it is clear that a key objective of the Australian atomic energy program is the ultimate use of nuclear power. At present the Australian AEC is concentrating on a program of research in reactor systems, with investigation being centered on high-temperature gas-cooled and liquid metal fuel systems.

Australia's first reactor, a 10-megawatt, heavy water moderated, high neutron flux materials testing and research reactor (HIFAR) went critical in January 1958. The reactor, based on the design of the British DIDO reactor, is fueled with enriched uranium fuel elements obtained from the United Kingdom. HIFAR is located at the newly constructed research establishment of the Australian AEC at Lucas Heights near Sydney. In addition to HIFAR the new research establishment includes physics, chemistry, and chemical engineering laboratories, some of which are still under construction.

A seven-man team of Commission representatives participated in the Australian symposium on the peaceful uses of atomic energy held at Sydney, June 2–6, 1958, and the team later participated in private discussions with the Australian AEC from June 9–13, 1958.

Burma

With the assistance of the Armour Research Foundation (which is under contract directly with the Burmese Government), the Burmese have formulated plans for an isotope research laboratory project. United States assistance in the form of a loan has been committed. The United States does not have an agreement for cooperation with Burma.

Republic of China

A research agreement for cooperation is in force between the United States and China. On March 28, 1958, the Chinese signed a contract with the International General Electric Co., for a 1-megawatt pool-type research reactor. The construction schedule calls for the reactor to be installed at the newly established Institute of Nuclear Science of the National Tsing-Hua University in Taiwan in January 1959.

Communist China

According to reports an experimental heavy water type power reactor with thermal power of 7 to 10 megawatts went critical in June 1958. The Soviet Union is reported to have furnished assistance in constructing the project and in training personnel.

Egypt

The Egyptians moved ahead rapidly in 1957–58 to implement the atomic energy agreement they signed with the Soviet Union in February 1956. They have planned and partially implemented a modest nuclear research center near Cairo. When completed, the center will include (1) a 2,000-kilowatt research reactor, (2) a nuclear physics laboratory with a 2.5 Mev. Van de Graaf accelerator, and (3) a radioisotope laboratory with equipment. A scientific instruments and equipment facility is also in operation in the National Research Institute in Cairo. Most of this equipment, as well as considerable training of personnel, has been provided by the Soviet Union. The Egyptians have requested assistance of the International Atomic Energy Agency in developing their program.

India

India has an ambitious atomic energy program aimed eventually at the production of electric power. However, no definite plans have been announced for the construction of a power reactor. Heavy emphasis is being put on achieving national self-sufficiency in terms of both personnel and materials. A processing plant for treating monazite sands is already in operation and the following facilities are planned or already under construction: (1) A plant for converting uranium salt into uranium metal, (2) heavy water production facilities, and (3) natural uranium fuel element fabrication facilities.

A 1,000-kilowatt pool type research reactor, designed and built in India and fueled by enriched uranium supplied by the United Kingdom, has been in opera-

tion 18 months. Work on India's second reactor, a 30-megawatt NRX-type reactor for materials testing and engineering studies, is continuing; however, it is a year behind schedule and will probably not be completed until some time in 1959. Canada is providing considerable technical assistance in the construction of this reactor, and the United States has sold India 21 tons of heavy water for use in it. Work on a zero energy research reactor also continues, with completion estimated for late 1958 or early 1959. India has asked the United States to furnish 15 tons of heavy water for use in this reactor on a lease, rather than a sale, basis. This request is presently under review.

The United States does not have an agreement for cooperation with India.

Indonesia

Subsequent to a visit by United States atomic energy consultants in March 1958, Indonesia has indicated an interest in receiving United States assistance in the implementation of its atomic energy program. A detailed program is currently being worked out. The United States does not have an agreement for cooperation with Indonesia.

Iran

It is anticipated that the agreement for cooperation between the United States and Iran signed on March 5, 1957, will be ratified by the Iranian Parliament in the near future. The University of Tehran signed a contract with AMF for the purchase of a 1-megawatt pool type research reactor on May 24, 1958.

Iraq

The agreement for cooperation between Iraq and the United States signed on June 7, 1957, has not been acted upon by the Iraqi Parliament.

Israel

A research agreement for cooperation is in force between Israel and the United States. On March 19, 1958, Israel signed a contract with AMF for the purchase of a 1-megawatt pool type research reactor. The Israelis are attempting to extract uranium from the phosphates of the Negev.

Japan

On June 16, 1958, a power agreement for cooperation was signed by the United States and Japan. This agreement will be submitted to the Japanese Diet for approval in September, and when it enters into effect, it will supersede the existing research agreement.

Japan, a highly industrial nation with increasing power requirements and dwindling conventional power sources, has, as one of the major objectives of its atomic energy program, the development and installation of power reactors. In 1957, the Japanese AEC announced its long-term atomic power program, as follows:

By fiscal year 1965—600 megawatts installed atomic power.

By fiscal year 1975—7,050 megawatts installed atomic power.

Under the 10-year comprehensive bilateral agreement signed with Japan on June 16, 1958, the Japanese plan to use part of the fuel (total net quantity 2,700 kilograms contained U–235) for (1) a 10-electrical-megawatt experimental power reactor (operation 1961) and (2) a 150-electrical-megawatt power reactor (operation 1964). As additional power reactor plans become firm it is contemplated that the fuel required could be increased by amendment to the agreement.

It is understood that Japan also plans to buy a 150-electrical-megawatt Calder Hall type reactor from the United Kingdom for completion in 1963.

In addition to stationary atomic powerplants, Japan, as a leading shipbuilding and maritime nation, has a keen interest in marine propulsion reactors and hopes to be in a position to utilize this power source within the next few years. Tentative plans are being developed for the construction of two large ship (tankers) propulsion reactors, possibly to commence operation in 1965 and 1966, and a small ship propulsion plant.

Although they will, undoubtedly, manufacture as many reactor components as possible in Japan, it will probably be necessary for them to import substantial amounts of equipment and materials, particularly in the early stages of their program.

Japan's first research reactor, a 50-kilowatt "water boiler" constructed by Atomics International, went critical in August 1957. Construction is progressing on the 10-megawatt CP–5-type reactor, the prime contractor for which is AMF Atomics, Inc., and criticality is expected in early 1959. Both reactors

are located at the Japan Atomic Energy Research Institute in Tokai-Mura, about 75 miles northeast of Tokyo.

Korea

A research agreement for cooperation is in force between the United States and the Republic of Korea. The Koreans have recently announced plans for a national atomic-energy program, which includes the establishment of an Atomic Energy Research Institute which will, at first, emphasize the application of radioisotopes in medicine, agriculture, and industry, and later include the establishment and operation of a research reactor. United States assistance in carrying out these plans has been requested.

Lebanon

A research agreement for cooperation is in force between the United States and Lebanon. Experts supplied by the United States conducted a radioisotopes course at the American University of Beirut in March and April 1958.

New Zealand

A research agreement for cooperation is in force between the United States and New Zealand. A United States atoms-for-peace mission visited New Zealand in April 1958 to provide technical advice in connection with the development of plans for the New Zealand program. Subsequently, an Institute of Nuclear Science, as part of the Department of Scientific and Industrial Research, was established by the New Zealand Government. New Zealand now plans to purchase an accelerator within a few months, and a research reactor later.

Pakistan

The Government of Pakistan, with which the United States has a research agreement for cooperation, is planning to obtain a research reactor, probably of the CP–5-type. Meanwhile, the United States has agreed to provide assistance to Pakistan in the form of expert consultants and atomic-energy laboratory equipment.

Philippines

A research agreement for cooperation is in effect between the United States and the Philippines. The Philippine Government has expressed interest in acquiring a pool-type research reactor. Pursuant to recent legislation, management of the Philippine atomic-energy program has been vested in a National Science Development Board, the chairman of which has broad power. An atomic-energy commissioner who reports to the board has also been appointed.

Thailand

Thailand has requested bids from United States manufacturers on a pool-type research reactor to be located near Bangkok. A research agreement for cooperation is in effect between the United States and Thailand.

Turkey

A research agreement for cooperation is in force between the United States and Turkey. In March 1958, the Turkish Government selected Istanbul as the site for the research reactor, and it is now soliciting bids for the construction of the reactor from United States firms.

Union of South Africa

A power agreement for cooperation between the United States and the Union of South Africa came into force on August 22, 1957. The South African Atomic Energy Board is planning its research program which, it is expected, will include a research reactor. The South African Government has also appointed a group to develop plans for power reactors to be utilized in supplying electricity for railways and city lighting in the Cape Province.

WESTERN HEMISPHERE

Argentina

The Argonaut-type reactor in Buenos Aires, which was constructed by the Argentine Atomic Energy Commission, went critical in January 1958. The Argentine commission has expressed an interest in fabricating similar reactors for other countries, with the proviso that enriched fuel elements would have to be obtained from the United States or other sources.

The Argentine commission is also interested in obtaining heavy water from the United States to be used in a heavy-water-moderated, natural-uranium research

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reactor. The present research agreement for cooperation will remain in force until July 1960.

Brazil

In January 1958, the 3–5-megawatt, pool-type research reactor, located at São Paulo, went critical. This reactor was constructed by the Babcock & Wilcox Co. for the Brazilian Atomic Energy Commission.

The research agreement for cooperation, which will remain in force until August 1960, was amended in July 1958 to increase the quantity of enriched uranium to 15 kilograms. The additional fuel will be used in a training-research reactor at the University of Minas Gerais, Belo Horizonte, and an Argonaut-type reactor (to be constructed by the Brazilians) at the University of Brazil, Rio de Janeiro.

The power agreement for cooperation, signed in July 1957, is presently awaiting Brazilian legislative approval. When approval is received, a diplomatic exchange of notes will bring the agreement into force.

Canada

The Canadians now have three reactors in operation at Chalk River, Ontario. First to operate was ZEEP, a heavy-water reactor, which has a nominal 10-watt power output, and is chiefly useful as a research reactor. The NRX, next in operation, was the world's first high-power, heterogeneous, heavy-water reactor, and is used for testing of special fuel elements. It was originally designed to use ordinary uranium metal fuel. Special fuel assemblies containing plutonium and enriched uranium have recently been used to compensate for loop experiments. NRU, which went into operation in November 1957, is an improved and much enlarged version of the NRX, and provides improved fuel-testing facilities. A low-power test reactor (PTR) is almost completed.

Hamilton College, McMaster University, Hamilton, Ont., purchased a 1-megawatt, swimming-pool research reactor from AFM Atomics, Inc.

Canada has also assisted in research work of other countries. An NRX reactor using ordinary uranium, is being built for India.

Canada does not have an extensive immediate program for construction of nuclear powerplants. Like the United States, Canada has sufficient alternate sources of energy for the short run. However, a heterogeneous, heavy-water reactor (NPD), rated at 20 electrical megawatts, is being built at Des Joachimes by the Canadian General Electric Co. as a demonstration reactor. On a long-term basis, the Canadians are also considering a 100–200 megawatt, nuclear power station and several small package-power units.

Since the bilateral agreement between the United States and Canada was signed on June 15, 1955, there has been considerable exchange of technical information and some exchange of fuel elements under a joint program for reprocessing between the two countries.

Chile

The research agreement for cooperation will remain in force until August 1960.

Colombia

The Colombian Institute of Nuclear Affairs is presently completing a review of bids made by several American reactor manufacturers for a lower-power training reactor. Final negotiations leading to the purchase of the reactor are expected before the first of the year. Their research agreement for cooperation will remain in force until July 1960.

Costa Rica

The research agreement for cooperation, signed in May 1956, is awaiting legislative approval in Costa Rica. When approved, a diplomatic exchange of notes will bring the agreement into force.

Cuba

The American Machine & Foundry Co. and Mitchell Engineering are planning to sign a contract with the Cuban Government for the construction of a 20.5 electrical-megawatt, boiling-water-type reactor to be located in Habana del Este. An important consideration in connection with this projected power reactor is the possibility that the 3-percent enriched fuel for the reactor might be leased rather than purchased from the United States. A power agreement is now in the final stages of negotiation. The research agreement for cooperation will remain in force until October 1962.

Dominican Republic

The research agreement for cooperation will remain in force until December 1961.

Ecuador

The research agreement for cooperation will remain in force until February 1963.

Guatemala

The research agreement for cooperation will remain in force until April 1962.

Nicaragua

The research agreement for cooperation will remain in force until March 1963.

Panama

In April 1958, Panama requested a draft research agreement for cooperation, and it is expected that negotiations will begin in the near future.

Peru

The research agreement for cooperation will remain in force until January 1961.

The power agreement, signed in July 1957, is presently awaiting Peruvian legislative action. When approval is received, a diplomatic exchange of notes will bring the agreement into force.

Plans call for the construction of a pressurized-water-type power reactor with an electrical capacity of 21 megawatts, designed and constructed by Babcock & Wilcox. The reactor will be located in the vicinity of Lima, and will be operated by the Swiss firm of Brown-Boveri. To date, there has been little action toward finalizing a contract between these companies and the Peruvian Government.

Uruguay

The research agreement for cooperation will remain in force until January 1961.

Venezuela

A 3–5-megawatt research reactor is being constructed by the General Electric Co. at the Venezuelan Institute of Scientific Research, near Caracas. Construction will be delayed about 15 months because the present Government has required that all local construction contracts must be renegotiated.

The research agreement for cooperation will remain in force until July 1960.

The power agreement for cooperation, negotiated under the former Government, but not in effect, is under study by the present Government.

Bolivia, El Salvador, Haiti, Honduras, Mexico, and Paraguay

No research or power agreements for cooperation are either under negotiation or in effect with these six countries. No significant action toward acquiring a research or power reactor through United States sources has been evidenced.

APPENDIX 6

MEMORANDUM OF UNDERSTANDING, REGARDING THE JOINT NUCLEAR POWER PROGRAM, PROPOSED BETWEEN THE EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM) AND THE UNITED STATES OF AMERICA

The steps taken by the Member States of the European Atomic Energy Community (Euratom) towards a united Europe and the consistent support of the United States for their efforts are an acknowledgment that, in a world being rapidly transformed by technical and political change, the problems our countries face call for increasing solidarity.

The Member States of Euratom urgently need nuclear power to be in a position to meet future energy requirements and to assure continued economic progress.

Both Euratom and the United States must carry through the nuclear revolution in industry with maximum speed and efficiency in order to remain in the forefront of progress and to open new horizons for further economic and social advance.

In order to achieve these objectives a large-scale joint development program of power reactors will be launched.

Euratom will benefit by the experience and capacity which the United States can provide to make a quick start on such a program. This will in turn provide the United States with the opportunity to accelerate its own industrial development of nuclear power for peaceful purposes by associating itself with the program. Conventional energy is generally more costly in Europe than in the United States, so that nuclear power approaches the competitive range of energy costs in Europe, a stage which will be reached only later in the United States.

For these reasons, the Commission of the European Atomic Energy Community and the Government of the United States of America have agreed to this Memorandum of Understanding which outlines a joint United States-Euratom development program of large-scale nuclear power reactors to be constructed in the European Atomic Energy Community in the next few years.

The aim of the joint program will be to bring into operation in the Community by 1963 about 1,000,000 electrical kilowatts of installed nuclear capacity in reactors of proven types developed in the United States, thus increasing substantially the total capacity envisaged by existing programs in the Member States. The program is consistent with, and in fact a point of departure towards, the program outlined in "A Target for Euratom".*

It is understood that the establishment and initiation of the joint program is subject to appropriate statutory steps, including authorization by the competent bodies of the Community and of the Government of the United States.

The joint program will be conducted so as to obtain the maximum support of the industries of the Community and the United States; indeed, their active participation is indispensable to the success of the program.

It is the hope and expectation of the Commission and the Government of the United States that the proposed program will lead to further cooperation between the Community and the United States in other fields related to the peaceful uses of atomic energy.

They also see in the joint program a new type of cooperation among allies on a fully equal footing based on organic links forged by common effort, and holding out hopes of new steps for the further development of the Atlantic Community.

The Commission of the European Atomic Energy Community and the Government of the United States reaffirm their dedication to the objectives of the International Atomic Energy Agency and intend that the results of their program will benefit the Agency and the nations participating in it.

1. OBJECTIVES

The objectives of the joint program will be:

A. To bring into operation by 1963, within the European Atomic Energy Community, large-scale power plants using nuclear reactors of proven types, on which research and development has been carried to an advanced stage in the United States, having a total installed capacity of approximately one million kilowatts of electricity and under conditions which would approach the competitive range of conventional energy costs in Europe.

B. To initiate immediately a joint research and development program centered on these types of reactors.

2. SELECTION AND APPROVAL UNDER THE PROGRAM

Under the joint program, reactor projects may be proposed, constructed and operated by private or governmental organizations engaged in the power industry or in the nuclear energy field.

The Commission and the Government of the United States will establish jointly, technical standards and criteria (including those relating to radiation protection and reactor safety) and the procedures for selection and approval of reactor projects under this program.

In the evaluation and selection of such reactor projects, the technical and economic features will be considered and approved jointly by the Commission and the United States Government.

Other features of such reactor projects will be considered and approved by the Commission.

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*Report submitted by Mr. Louis Armand, Mr. Franz Etzel, and Mr. Francesco Giordani at the request of the Governments of Belgium, France, the Federal Republic of Germany, Italy, Luxembourg, and the Netherlands.

Reactors now being planned or constructed in Member States of the Community will be eligible for, and will receive, early consideration under the criteria established pursuant to this section.

It is intended to take and announce decisions on the above matters at the earliest practicable date.

3. CAPITAL COSTS

The total capital cost* of the nuclear power plants with an installed capacity of approximately one million kilowatts of electricity to be constructed under the program is presently estimated not to exceed the equivalent of $350,000,000 to be financed as follows:

A. Approximately $215,000,000 to be provided by the participating utilities and other European sources of capital, such financing to be arranged with the appropriate assistance of Euratom; and

B. Up to $135,000,000 to be provided by the United States Government to Euratom in the form of a long-term line of credit on terms and conditions to be agreed, such funds to be re-lent by Euratom for the construction of facilities under this program.

4. FUEL CYCLES

The Commission and the Government of the United States will enter into special arrangements with respect to the fuel cycles for reactors to be constructed and operated under the proposed program according to the principles set forth in Attachment A to this memorandum.

5. CHEMICAL PROCESSING

The United States Atomic Energy Commission is prepared to process in its facilities, at established U. S. domestic prices, spent fuel elements from the reactors to be included in the present program. The United States Atomic Energy Commission agrees to assist in the development of chemical processing techniques in Europe by providing technical advice and assistance both to "Eurochemic" (which is to design and build a pilot plant at Mol, Belgium), and to the Community in the design and construction of future plants which the Community may decide to design and construct, or to sponsor.

6. RESEARCH AND DEVELOPMENT

A. The Commission and the Government of the United States intend to initiate promptly a joint program of research and development to be conducted both in the United States and in Europe on the types of reactors to be constructed under the proposed program.

This Research and Development program will be aimed primarily at the improvement in performance of these reactors and at lowering fuel cycle costs.

It will also deal with plutonium recycling and other problems relevant to these reactors, thus contributing to the over-all advance of the nuclear power art.

The research and development program will be established for a ten (10) year period. During the first five (5) years the financial contribution of the Community and the United States will amount to about $50,000,000 each. Prior to the completion of the first five-year period, the Parties will determine the financial requirements for the remaining five-year period and will undertake to procure funds necessary to carry out the program. Funds for the second five-year period may be in the same order of magnitude.

The administration of this program will be conducted under mutually agreed arrangements.

B. In addition, both the Commission and the United States Atomic Energy Commission will push forward and extend their own research and development programs, either direct or sponsored, on all peaceful aspects of nuclear science and industry, in particular in such fields as advanced civilian reactor design, fuel technology, reactor operation, chemical processing, radioisotopes utilization, waste disposal, and public health.

Information resulting from such work outside of the joint program will be exchanged by the respective Commission fully and promptly.

*Exclusive of the fuel inventory.

7. SPECIAL NUCLEAR AND OTHER MATERIALS

The Government of the United States will make available to the Community, as needed, enriched uranium for the nuclear power reactors to be included within the proposed program, in sufficient quantity to meet inventory and operating requirements for a twenty (20) year operating period.

The Government of the United States also will provide the Community special nuclear materials as may be agreed for research and development and the operation of research and test reactors associated with the proposed power program, in sufficient quantity to meet inventory and operating requirement for a twenty (20) year operating period. In addition, source material, special reactor material and other materials needed for carrying out the program will be provided under terms and conditions to be agreed upon.

8. AVAILABILITY OF INFORMATION

A. Nonpatentable information developed in joint program

1) The program contemplated by this Memorandum of Understanding, including projects selected for inclusion therein, should serve to benefit other projects and programs (both private and governmental) within the Community and the United States. Accordingly, under mutually agreed arrangements, all information developed in connection with the joint program of research and development, and all information developed in connection with the selected projects, concerning designs, plans and specifications, construction costs, operations and economics, will be delivered curretly to the Parties as developed and may be used, disseminated, or published by each Party for any and all purposes as it sees fit without further obligation or payment. There will be no discrimination in the dissemination or use of the information for the reason that the proposed recipient or user is a national of the United States or of any Member State of Euratom.

2) Both Commissions shall have access to the records of the participating contractors pertaining to their participation in research and development projects under the joint research and development program, or pertaining to the performance of fuel elements that are the subject of United States guarantees.

3) The Parties will further expedite prompt exchange of information through symposia, exchange of personnel, setting up of combined teams, and other methods as may be mutually agreed.

B. Patentable information

As to any invention made or conceived in the course of or under the joint program of research and development:

1. The United States shall without further obligation or payment be entitled to assignment of the title and rights in and to the invention and the patents in the United States, subject to a non-exclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the Community for all purposes.

2. The Community shall without further obligation or payment be entitled to assignment of the title and rights in and to the invention and the patents in the Community, subject to a non-exclusive, irrevocable, and royalty-free license, with the right to grant sublicenses, to the United States for all purposes.

3. With respect to title and rights in and to the invention and patents in third countries:

a. The Community, if the invention is made or conceived within the Community, or the United States, if the invention is made or conceived within the United States, shall be entitled to assignment of such title and right, subject to a non-exclusive, irrevocable, royalty-free license, with the right to grant sublicenses, to the other for all purposes.

b. If the invention is made or conceived elsewhere, the Party contracting for the work shall be entitled to assignment of such title and rights, subject to a non-exclusive, irrevocable, royalty-free license, with the right to grant sublicenses, to the other for all purposes.

C. As to inventions and patents under paragraph B. of this Article neither Party shall discriminate in the granting of any license or sublicense for the reason that the proposed licensee or sublicensee is a national of the United States or any Member State.

D. As to patents used in the work of the joint program, other than those under paragraph B, which the United States owns or as to which it has the right

to grant licenses or sublicenses, the United States will agree to grant licenses or sublicenses, covering use either in or outside the joint program, on a non-discriminatory basis to a Member State and to industry of a Member State, if the Member State has agreed to grant licenses or sublicenses as to patents used in the work of the joint program which it owns or as to which it has the right to grant licenses or sublicenses on a non-discriminatory basis to the United States and to industry of the United States, covering use either in or outside of the joint program.

E. The respective contractural arrangements of the Parties with third parties shall contain provisions that will enable each Party to effectuate the foregoing provisions of B and C as to patentable information.

F. It is recognized that detailed procedures shall be jointly established to effectuate the foregoing provisions and that all situations not covered shall be settled by mutual agreement governed by the basic principle of equivalent benefits to both Parties.

9. TRAINING

The Commission and the United States Atomic Energy Commission will work closely together to develop training programs to satisfy the requirements of the programs described in this memorandum. The United States Atomic Energy Commission will assist the Commission in satisfying these needs by making its facilities and experience available.

10. COOPERATIVE ACTIVITIES IN INDUSTRY

It is expected that the program to be initiated under the terms of this Memorandum of Understanding will increase the cooperation already existing between individuals and organizations, both privately and publicly owned, engaged in nuclear industry, in the United States and in the countries of the Community. The Commission and the Government of the United States will use their best efforts to foster such cooperation.

11. SAFEGUARDS AND CONTROLS

Both Euratom and the United States recognize the extreme importance of assuring that all activities under the joint program shall be directed solely toward the peaceful uses of atomic energy. In accord with this objective:

A. Euratom guarantees that:

1. No material, including equipment and devices, transferred pursuant to the Agreement for Cooperation between the United States and the Community to the Community or to authorized persons within the Community will be used for atomic weapons, or for research on or development of atomic weapons, or for any other military purpose;

2. No such material will be transferred to unauthorized persons or beyond the control of the Community, except as the United States may agree to such transfer and then only if the transfer of the material is within the scope of an Agreement for Cooperation between the Government of the United States of America and another nation or group of nations;

3. No source or special nuclear material utilized in, recovered from, or produced as a result of the use of materials, equipment, or devices transferred pursuant to the Agreement for Cooperation between the United States and the Community to the Community or authorized persons within the Community will be used for atomic weapons, or for research on or development of atomic weapons, or for any other military purpose;

4. The Community will establish and maintain a mutually satisfactory system of safeguards and controls, to be applied to materials, equipment, and devices subject to the guarantees set forth in paragraphs 1 through 3 above.

B. Euratom undertakes the responsibility for establishing and implementing a safeguards and control system designed to give maximum assurance that any material, equipment, or devices made available pursuant to the Agreement between the United States and Euratom, and any source or special nuclear material derived from the use of such material, equipment or devices, shall be utilized solely for peaceful purposes. In establishing and implementing its safeguards and control system the Community is prepared to consult with and exchange experience with the International Atomic Energy Agency with the objective of establishing a system reason-

ably compatible with that of the International Atomic Energy Agency. The United States and Euratom will formulate and agree upon the principles which will govern the establishment and operation by Euratom of a mutually satisfactory safeguards and control system under the Agreement for Cooperation between the United States and Euratom. These principles are set forth in Attachment "B" and will be included in the text of the Agreement.

C. As has been requested by Euratom, the United States will provide assistance in establishing the Euratom safeguards and control system, and will provide continuing assistance in the operation of the system.

D. There will be frequent consultations and exchanges of visits between the Parties to give assurance to both Parties that the Euratom safeguards and control system effectively meets the responsibility and principles stated in B above and that the standards of the materials accountability systems of the United States and Euratom are kept reasonably comparable.

E. In recognition of the importance of the International Atomic Energy Agency, the United States of America and the European Atomic Energy Community will consult with each other from time to time to determine whether there are any areas of responsibility with regard to safeguards and control and matters relating to health and safety in which the Agency might be asked to assist.

F. A continuation of the cooperative program between the United States and Euratom will be contingent upon Euratom establishing and maintaining a mutually satisfactory and effective safeguards and control system which is in accord with the principles originally agreed upon.

12. THIRD PARTY LIABILITY

The Community and the Government of the United States recognize that adequate measures to protect equipment manufacturers and other suppliers as well as the participating utilities against now uninsurable risk are necessary to the implementation of the joint program. The Euratom Commission will seek to develop and to secure the adoption, by the earliest practicable date, of suitable measures which will provide adequate financial protection against third party liability. Such measures could involve suitable indemnification guarantees, national legislation, international convention, or a combination of such measures.

13. TARIFFS

The Commission will take all action open to it under the Treaty to minimize the impact of customs duties on goods and products imported under this joint program.

14. EXISTING AGREEMENTS

Existing agreements for cooperation in the field of nuclear energy between Member States and the United States of America are not modified by the joint program, but will be subject to appropriate negotiations pursuant to article 106 of the Treaty. Modifications may be made as necessary to permit transfers of reactor projects now contemplated under existing agreements that qualify for and are accepted under the joint program.

15. ADMINISTRATION OF THE PROGRAM

In order to assure the initiation and effective execution of this program, agreement will be reached on the over-all organization needed to establish and carry out the joint program, including the establishment of such joint groups as are required.

The Commission of the European Atomic Energy Community (Euratom)

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JOHN FOSTER DULLES
LEWIS L. STRAUSS

At Brussels on May 29, 1958, and at Washington on June 12, 1958.

APPENDIX 7

DEPARTMENT OF STATE,
Washington, D. C., August 6, 1958.

Hon. CARL T. DURHAM,
United States House of Representatives.

DEAR MR. DURHAM: In the course of the executive session on August 5 of the Joint Committee on Atomic Energy, I was asked by the committee to inquire of Mr. Max Kohnstamm, chief, Euratom delegation, European Atomic Energy Community, what the effect would be on the proposed United States-Euratom program should the Congress find it possible only to enact the international agreement. It is in response to this request, which I conveyed to him, that Mr. Kohnstamm has written me the attached letter.

Sincerely yours,

DOUGLAS DILLON,
Under Secretary of State for Economic Affairs.

EUROPEAN ATOMIC ENERGY COMMUNITY,
Brussels, Belgium, August 6, 1958.

Hon. C. DOUGLAS DILLON,
Under Secretary of State for Economic Affairs,
Department of State, Washington, D. C.

DEAR MR. DILLON: I am so terribly sorry to hear that my remarks concerning what, from the European viewpoint, would be needed in order to go on with the planned joint United States-Euratom program have given rise to some misunderstanding. I must have expressed myself confusedly. I am grateful to you to permit me to state why the Euratom Commission believes that congressional action at this time on the draft international agreement only, although encouraging in its recognition of Euratom, would not be sufficient to maintain the momentum which the planned joint program has already created.

In the memorandum of understanding and in the draft agreement for cooperation, conditions and incentives are outlined which would induce our public and private power companies to build large-scale nuclear-power reactors of types developed in the United States. A certain number of large-scale, gas-cooled, natural-uranium reactors will be in operation in our nations by 1936, but the European energy situation, as outlined in A Target for Euratom, makes it imperative to augment the number of electrical kilowatts to be installed by that time and, also, to exapnd as far as possible the number of lanes of approach to the problem of large-scale, industrial nuclear power.

During the discussions concerning the draft program, contact with industries gave us virtual certainty that the goal of the program—the construction of 1 million electric kilowatts by European public and private power companies before the end of 1963—could be attained if the conditions and incentives outlined in it would materialize. Important and time-consuming work of detail has to be performed by the Euratom Commission, the United States Atomic Energy Commission, European power companies, and American firms experienced in the construction of reactors before actual construction can begin. Every year that is lost in constructing nuclear-power stations means that conventional stations will be built, instead, requiring increased oil imports, which continue to consume oil throughout their 20- or 30-year lifetime. The Euratom Commission, therefore, considers it highly important that the target date set by the proposed program for the end of 1963 be maintained. This would mean that construction of the first reactors to be built under the program should begin in the first half of 1959.

It is, therefore, essential that tentative plans which have been made by Europe's power companies would be made definitive during the near future. Our conversations have convinced us that this would be virtually impossible if no assurances could be given concerning such major points of the program as the fuel guaranty, the conditions under which nuclear fuel can be obtained, the plutonium produced in the reactors can be disposed of, processing charges, etcetera. It seems, further, equally imperative that the joint research and development program should be started right away.

It was hoped during the negotiations that the proposed agreement for cooperation would become effective before the end of the present session of Congress. The late date on which we agreed upon the draft agreement for cooperation rules out this possibility, I am informed, unless the Congress would

decide to waive certain requirements of existing law. I understand that there are difficulties in this respect. While this is a matter of regret on our part, I do not believe it need be fatal for the program if the Euratom Commission could be put into a position to point out to Europe's industry that the administration and the Congress of the United States have given their approval both to he goal of the joint program (1 million kilowatts to be installed by the end of 1963) and to the means whereby this goal is to be attained. The Euratom Commission considers that legislative approval of the basic principles of the program, such as are contained in the draft Euratom Cooperation Act of 1958, would give appropriate assurances.

After having tried to summarize the economic and technical reasons which underlie the above-mentioned conviction of the Euratom Commission, I would like to draw your attention, also, to political factors which make it so important to move ahead with the program with the greatest speed. As you know, the treaty setting up Euratom has been voted by overwhelming majorities in the parliaments in the six member nations. With the exception of the Communist Party, all the major political parties, those in government and in opposition, voted in favor of the treaty.

But no one knows better than you how difficult it is to change Europe's existing economic and political structures, even though public opinion as expressed in Europe's parliaments is in favor of such change. Euratom has been set up at a very propitious moment, when Europe's nuclear industry is still in its infancy. The setting up of Euratom has given rise to great hopes for the development, not of 6 separate national programs closed off from each other, but of 1 European nuclear effort, enabling Europe to attack an increasing power shortage common to the 6 member nations. The planned joint program has heightened these hopes, adding the prospects of close links between the industries of Europe and the United States. But only through action by Euratom can these hopes be realized. For all these reasons, it is the Euratom Commission's sincere belief that the opportunity we have today to initiate this major program is unique, and, if not seized, may be lost without the possibility of recovery.

For Euratom, time is of the essence. The first year of its operation may well decide whether, through effective action, it will become an important step on the road toward European unification. In the opinion of the Euratom Commission, the joint program, if executed with speed, would contribute in an impressive way not only to the development of the peaceful uses of atomic energy but, also, to the unification of Europe, to which the United States has already contributed so much.

Sincerely yours,

MAX KOHNSTAMM.

APPENDIX 8

SUMMARY OF EURATOM TREATY

Submitted by the Atomic Energy Commission

The move to establish Euratom was initiated in May of 1955 when, at the conclusion of the Messina Foreign Minister's Conference, a committee was created under the leadership of Paul Henri Spaak, the Foreign Minister of Belgium, to study the concept of an atomic pool and a customs union.

The treaty establishing the European Atomic Energy Community (Belgium, the Netherlands, France, Germany, Italy, and Luxembourg) was signed in Rome on March 25, 1957, and came into effect on January 1, 1958.

A. Objectives

The aim of the Community, as stated in the treaty, is "to contribute to the raising of the standard of living in member states and to the development of commercial exchanges with other countries by the creation of conditions necessary for the speedy establishment and growth of nuclear industries." To this end, a major objective is to help industry to acquire rapidly the necessary technical and industrial means for and to promote the large-scale production of nuclear power in Western Europe. The Community also is charged with responsibility, with the six countries, for developing research, disseminating information, establishing uniform health and safety standards, facilitating investment, insuring the supply of ores and nuclear fuels, and guaranteeing, by

appropriate measures of control, that nuclear materials are not diverted "from their intended uses as stated by the users."

B. Organization

The objectives of the treaty are to be attained by common action of the Community, acting through the following institutions:

(*a*) *The Commission.*—An executive body of (and the principal organ of the Community) of five members appointed by the mutual agreement of the governments of the members states for a period of 4 years. This body will take decisions which have the force of law in the member states and supervise the application of the provisions of the treaty and the provisions adopted by the institutions of the Community. The Commission will be assisted by a Scientific and Technical Advisory Committee, composed of 20 members. The members of the Commission are: Louis Armand, of France, Prof. Paul de Groote, of Belgium; Heinz L. Krekelor, of Germany; Prof. Enrico Medi, of Italy; and Dr. Emanuel Sassen, of the Netherlands.

(*b*) *Council of Ministers.*—A policy group with power to "take any measures within its competence to coordinate actions of the member states and of the Community." The Council generally acts upon the recommendations of the Commission; it adopts such recommendations by a simple or specially determined majority but may amend or reject such recommendations only by unanimous vote. The apportionment of votes is 4 each for France, Germany, and Italy, 2 each for Belgium and the Netherlands and 1 for Luxembourg.

(*c*) *Assembly.*—A body to be composed of 36 members each from France, Germany, and Italy, 14 each from Belgium and the Netherlands, and 6 from Luxembourg. Members are to be appointed by the parliaments of the respective states concerned or elected by direct universal suffrage. By a two-thirds majority, the Assembly may adopt a motion to consure the Euratom Commission. Such action involves the obligation of the members of the Commission "to terminate their duties in a body."

(*b*) *Court of justice.*—A seven-judge court to be appointed for a term of 6 years by the governments of the member states having competence to decide the legality of regulations and decisions of the Council and Commission. When a member state or an enterprise fails to fulfill its obligations, the court can, at the request of the Commission, order such state or enterprise to take the necessary measures. The court also has full jurisdiction to establish the conditions for the granting of licenses by the Commission and to hear appeals with respect to penalties in the matter of security control.

(*e*) *Economic and Social Committee.*—A group, common to the European Economic Community, will serve in an advisory capacity to the Council and the Commission. Its members, who will represent the various categories of economic and social life, "shall be appointed for terms of 4 years by the Council acting by means of a unanimous vote on a proposal of the Commission." The apportionment of membership is 24 each for France, Germany, and Italy; 12 each for Belgium and the Netherlands; and 5 for Luxembourg.

c. Functions

The treaty defines the principal functions of Euratom as follows:

(*a*) *Research.*—The Commission will be charged with promoting, coordinating, and facilitating nuclear research in the member states and will also create a common center for nuclear research. The Commission may provide financial or technical support or free materials and equipment to the research programs of member states and may have work done under contract either within the Euratom nations or elsewhere. The community will also create schools for the training of specialists, including "an institution at the university level." There will be a budget of $215 million for the first 5 years.

(*b*) *Information.*—As a general rule, in order to promote technical progress, the Commission shall communicate to member states, persons, or enterprises any information acquired by the community, although the Commission "may make the communication of this information conditional on its being treated as confidential and not transmitted to third parties." The Commission will also organize a procedure whereby member states, persons, or enterprises may use it as an intermediary for the exchange of the results of research. With certain exceptions, agreements concerning the exchange of information with a party outside the community involving the signature of a state "exercising its sovereignty" will be concluded by the Commission.

(*c*) *Patents.*—The Commission must grant to enterprises in member states "licenses and sublicenses to use the patents and similar rights which belong to

the community." Also, the member states "undertake to communicate to the Commission the contents of any patent application concerning a "specifically nuclear subject" not later than 18 months after it is filed, and to inform the Commission of the existence of all other patents "directly connected with and essential to the development of nuclear energy." The contents of these latter patents must then be provided to the Commission if it requests them. Under certain limited conditions provided for by the treaty, the Commission may request the granting of compulsory licenses for the use of all the patents concerned. The patentholder will be entitled in such case to "full compensation." An arbitration committee is created to settle all disputes relating to the granting of compulsory licenses. Decisions of the community may be referred to the court.

(*d*) *Health.*—During the first year of Euratom's existence, basic health and safety standards must be adopted by the Council. Member states are obliged to adopt laws and regulations and establish the necessary facilities insuring compliance with these standards.

(*e*) *Investments.*—In order to encourage the initiation of public and private enterprises and to facilitate a coordinated development of financial investment, the Commission is obliged to publish programs within the community at regular intervals, defining their production targets and the investments involved. Important nuclear enterprises belonging to the nuclear sector must inform the Commission of investment plans. After study and discussion with the enterprise, the Commission must inform the interested member state of its views.

(*f*) *Joint enterprises.*—Enterprises that are of "prime importance to the development of nuclear industry" in the community may, by decision of the Council, be set up as joint enterprises and as such have bylaws of their own. Proposals for joint enterprises are to be investigated by the Commission, which will transmit to the Council a detailed opinion thereon. If this opinion is favorable, the Commission will submit to the Council proposals concerning the location of the plant, the bylaws, the amount and schedule of financing, the participation of third state, international organizations, or nationals of third states in the financing and management of the enterprise.

(*g*) *Fuel supply.*—The task of providing ores, source materials and fissionable materials to users in the community will be performed by a separate supply agency under the control of the Commission. This agency is given an option on the ores and source and fissionable materials produced in the territories of the member states, as well as "exclusive" right to conclude all contracts relating to the supply of such ores and materials originating outside or within the community. The agency will operate "on the principle of equal access to resources." Prices will be based on supply and demand. If the agency cannot fill its orders, "users will have the right to conclude contracts directly * * * outside the community" with the Commission's approval. Nationals of States that neglect the mining possibilities of their countries may be refused access to the other internal resources of the community.

(*h*) *Security control.*—Although the community "program" is addressed almost exclusively to peaceful purposes, the treaty does not prevent members from producing weapons or from utilizing materials obtained from the community in a weapons program. Only Germany is debarred from such development because of the Paris agreements of 1955. Instead, the control system is designed to prevent the diversion of materials from their intended uses. It also is designed to make sure that the community can abide by any undertakings concluded with a third country or international organization. To assure this, the Commission is empowered to require reports and records from users and to send inspectors into member states "to collect all useful information and audit data." The Commission may impose penalties for violations "which, in order of gravity, will be as follows: warning, withdrawal of special advantages (financial aid, technical assistance), placing under temporary management, total or partial withdrawal of materials." Failures to comply with Commission injunctions will be brought before the court of justice.

It should be noted that, under the terms of article 84 (treaty) "Control may not extend to materials intended for the purposes of defense which are in course of being specially prepared for such purposes or which, after being so prepared, are, in accordance with an operational plan, installed or stocked in a military establishment." [1]

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[1] See appendix for more detailed outline of control provisions of treaty.

(*i*) *Ownership.*—Fissionable materials produced or imported by member states will be the property of the community. Control and ownership of fissionable materials intended for purposes of defense ceases if such materials are being specially prepared for defense purposes. (The treaty grants the Commission the right to guarantee that materials imported into the community will never be used for such purposes and will therefore always remain the property of the community.) Member states and their nationals will have "full right to use and consume the special fissionable materials property in their possessions;" subject, however, to the obligations resulting from security control, the supply agency's right of option, and health protection.

(*j*) *Common atomic market.*—In contrast to the gradual transition contemplated for the full common market under the treaty, European Economic Community, there will be created rapidly a common market for the nuclear industry. One year after the entry into force of the treaty, a common tariff is to be applied for atomic ores, fuel, and "other specifically atomic products." From that time forward, the member states agree to "abolish among themselves all import and export duties and charges as well as all quantitative restrictions." The member states also agree to "abolish all restrictions based on nationality concerning eligibility for skilled employment in the nuclear field and participation in the construction of atomic installations; they will facilitate the conclusion of insurance contracts covering atomic risk, as well as movements of capital for the purpose of financing certain atomic production projects; they will authorize necessary payments in the currency of the member state in which the creditor or beneficiary resides."

(*k*) *External relations.*—Member states will be required to communicate to the Commission draft agreements with parties outside the Community. They may not conclude a proposed agreement until they have overcome any objections that may be raised by the Commission, or "until they have complied with an emergency decision of the Court, made at their request, on the compatibility of the treaty with the clauses envisaged." Member states which, before the entry force of the treaty, have concluded agreements with third states concerning cooperation in the field of atomic energy, "must undertake together with the Commission, the necessary negotiations with such third states, with a view to having the Community take over the rights and obligations resulting from those agreements." The Community itself has power to conclude treaties and agreements without outside countries. It will take the place of member states in several areas of external relations, particularly those concerning the supply of materials and accountability.

(*l*) *Financial provisions.*—Euratom will have two budgets—an operating budget, "which will include administrative expenses and expenses of security control and health protection," and a research and investment budget.

Their budgets will be financed initially by contributions from the member states, on the basis of a ratio of 28 (France, Germany, Italy) to 7.9 (Belgium and Netherlands) to 0.2 (Luxembourg) for operations, and 30 (France, Germany) to 23 (Italy) to 9.9 (Belgium) to 6.9 (Netherlands) to 0.2 (Luxembourg) for research and investment.

The treaty provides, however, that the Commission will consider under what conditions these contributions can be replaced by the Community's own receipts, particularly receipts from levies imposed in the member states.

Preliminary budget estimates are to be drawn up by the Commission and submitted to the Council. The Council, in turn, will prepare the final budget estimates and transmit them to the Assembly. The Assembly will return them to the Council with any proposed changes. The Council will make the final decision on the operating budget on the basis of 12 out of 17 votes. The Council's final decision on the research and investment budget will be on the basis of 67 out of 100 votes, with France and Germany each casting 30 votes. Italy casting 23, Belgium casting 9, Netherlands casting 7, and Luxembourg casting 1.

(*m*) *Projects already underway.*—The treaty takes account of projects already underway by permitting such member state, during the first years of the treaty, "to allocate to its own needs on a priority basis the ores and source materials produced in its territory and the source or fissionable materials forming the subject of a bilateral agreement concluded before the entry into force of the treaty."

(*n*) *Timetable.*—Among other things, the treaty requires the following specific action:

(1) Within 1 year the Commission must develop a proposal for "an institution of university standing" and establish its standards of health protection.

(2) Within 3 months the member states must inform the Commission of their laws in the health and safety field, and the proposed rules and regulations of the supply agency, which will govern ore procurement, must be submitted to the Council.

APPENDIX

THE SAFETY CONTROL SYSTEM IN THE EURATOM TREATY

System.—The rules governing safety control are laid down in chapter VII of the treaty (art. 77 to 85). Basically they contain provisions similar to those which are laid down in article XII of the statute of the International Agency dealing with the Agency's safeguards.

Scope.—The Euratom Commission is responsible for the implementation of the safety control within the territory of the member states. The Commission shall satisfy itself that:

(*a*) Nuclear materials are not diverted from their intended use;

(*b*) Supply provisions including those agreed upon with suppliers outside the Community (art. 52) are observed;

(*c*) Any special undertaking concerning control measures entered into by the Community in an agreement concluded with a third country is kept.

Machinery

(*a*) In Euratom there is an obligation to declare but there is no licensing system for the use of nuclear material. However the processes to be used for the chemical processing if irradiated material require the approval of the Commission (art. 78).

(*b*) Operating records shall be maintained in order to permit accountability for ores, source material, and special fissionable material during their use, production, or transport.

(*c*) If the Commission so requires, any excess special fissionable materials recovered or produced as a byproduct, not in use or not ready for use, shall be deposited either with the (Euratom) Agency or in facilities controlled by the Commission.

(*d*) Inspection shall take place by inspectors who "shall at all times have access to all places and data and to any person who, by reason of his or her occupation, deals with materials, equipment, or facilities subject to control." In partícular these inspectors shall verify the operating records.

Legal procedures (through the Court of Justice) have been established in case of opposition to the carrying out of the inspection. If there is danger of delay, the Commission may itself issue a written order to proceed with the control, whereupon the national authorities shall insure access by the inspectors to the place named in the decision.

Procedure in case of infringement

The Commission may require the member state concerned to take all necessary measures to terminate any infringement found to exist and shall inform the Council of Ministers thereof. If the member state does not comply, the Commission or any interested member state may refer the matter to the Court of Justice.

Penalties may be imposed on persons or enterprises violating their obligations; these penalties may comprise, in order of severity (art. 83):

(*a*) A warning; or

(*b*) The withdrawal of special facilities such as financial or technical assistance; or

(*c*) The placing of the enterprise, for a maximum period of 4 months, under the administration of a person or a group appointed jointly by the Commission and the state having jurisdiction over such enterprise; or

(*d*) The complete or partial withdrawal of source or special fissionable material. Generally speaking, the member states are obliged to insure enforcement of the penalties.

As to special fissionable material the provisions governing supplies contain an additional safeguard in that the Agency has the exclusive right to export such materials and that each export operation requires the authorization of the Commission (art. 59b and art. 62, i–c).

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